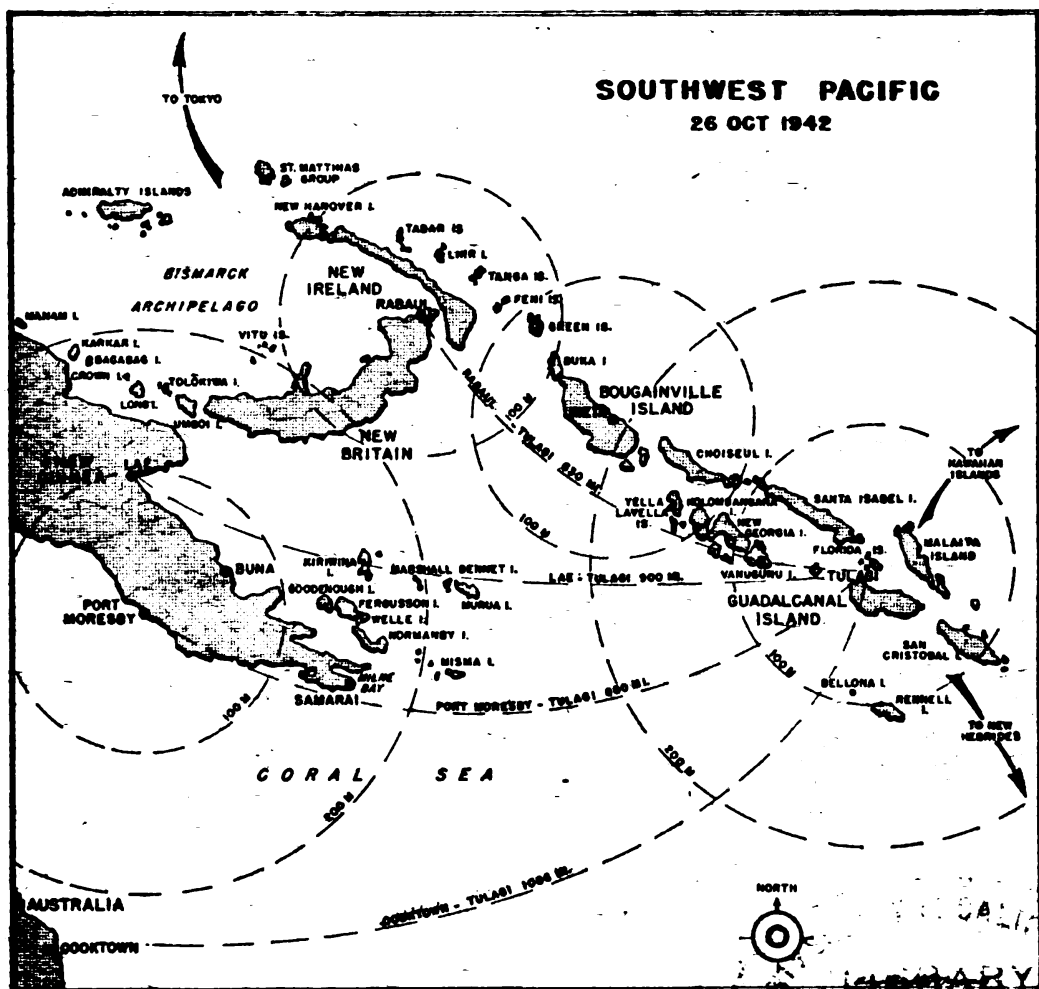


# THE BULLETIN

OF THE

## U. S. Army Medical Department

A periodical containing original articles, reviews, news, and abstracts of interest to the Medical Department of the Army



ISSUED UNDER THE AUSPICES OF  
THE OFFICE OF THE SURGEON GENERAL

PUBLISHED MONTHLY AT THE MEDICAL FIELD SERVICE SCHOOL,  
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NORMAN T. KIRK,  
Major General, U. S. Army,  
The Surgeon General.

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**OF THE**  
**U. S. Army Medical Department**

**ISSUED MONTHLY**

**WAR DEPARTMENT,  
OFFICE OF THE SURGEON GENERAL,  
WASHINGTON 25, D. C.**

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## Foreword

With the October 1943 issue, The Bulletin became a monthly periodical, instead of a quarterly, dedicated to keeping the personnel of the Medical Department informed on developments in war medicine. The new publication, known as The Bulletin of the U. S. Army Medical Department, absorbed the former quarterly dental and veterinary bulletins and will have material devoted to those fields in each issue.

The Bulletin is intended to be educational rather than directive in nature. It will contain the best information obtainable concerning military medical experience, observations, and procedure that may help to improve further the quality of professional services. The Bulletin will be a medium whereby experience gained in one theater of combat may be shared with those serving in other combat areas and with those in this country who are preparing for overseas duty. News items concerning military and scientific developments as well as original articles will be emphasized. The Bulletin, however, should not serve as a basis for the forwarding of requisitions for equipment or supplies referred to therein.

Obviously, some of the most interesting field experiences cannot be divulged in a periodical of this kind when our country is at war. The Bulletin will, however, publish that which can be safely told, drawing not only on current literature, but on many authoritative reports which reach The Surgeon General's Office from the field. Officers are invited to submit for publication reports of their field experiences that can profitably be shared with other officers.

The Medical Department has been commended for its work in caring for the sick and wounded in theaters of operations in war. The Bulletin will endeavor to stimulate such progress and to advance further the high standard of medical service in the Army of the United States.

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**U. S. Army doctors operate out of doors, to permit a greater number of men to be treated at this evacuation hospital. La Cambe, France. 17 June 1944. Signal Corps photograph.**



**American casualties in a boat that will take them to a hospital in New Georgia. 12 July 1943.**

# News and Comment

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## GENERAL MARSHALL'S REPORT—THE MEDICAL DEPARTMENT

In his biennial report to the Secretary of War, General George C. Marshall, Chief of Staff of the United States Army, paid tribute to the Medical Department for its outstanding work in World War II, as follows:

The remarkable reduction in the percentage of deaths from battle wounds is one of the most direct and startling evidences of the great work of the Army medical service. In the last two years Army hospitals treated 9,000,000 patients; another 2,000,000 were treated in quarters and more than 80,000,000 cases passed through the dispensaries and received outpatient treatment. This tremendous task was accomplished by 45,000 Army doctors assisted by a like number of nurses and by more than one-half million enlisted men, including battalion aid men, whose courage and devotion to duty under fire has been as great as that of the fighting men they assisted.

One of the great achievements of the Medical Department was the development of penicillin therapy which has already saved the lives of thousands. Two years ago penicillin, because of an extraordinarily complicated manufacturing process, was so scarce the small amounts available were priceless. Since then mass production techniques have been developed, and the Army is now using 2,000,000 ampules a month.

Despite the fact that United States troops lived and fought in some of the most disease-infested areas of the world, the death rate from non-battle causes in the Army in the last two years was approximately that of the corresponding age group in civil life—about 3 per 1,000 per year. The greater exposure of troops was counterbalanced by the general immunization from such diseases as typhoid, typhus, cholera, tetanus, smallpox, and yellow fever, and, obviously, by the fact that men in the Army were selected for their physical fitness.

The comparison of the nonbattle death rate in this and other wars is impressive. During the Mexican War, 10 percent of officers and enlisted men died each year of disease; the rate was reduced to 7.2 percent of Union troops in the Civil War; to 1.6 percent in the Spanish War and the Philippine Insurrection; to 1.3 percent in World War I; and to 0.6 percent of the troops in this war.

Insect-borne diseases had a great influence on the course of operations throughout military history. Our campaigns on the remote Pacific Islands would have been far more difficult than they were except for the most rigid sanitary discipline and the development of highly effective insecticides and repellents. The most powerful weapon against disease-bearing lice, mosquitoes, flies, fleas, and other insects was a new chemical compound commonly known as DDT. In December 1943 and early 1944, a serious typhus epidemic developed in Naples. The incidence had reached fifty cases a day. DDT dusting stations were set up and by March more than a million and a quarter persons had been processed through them. These measures and an extensive vaccination program brought the epidemic under control within a month. Shortly after the invasion of Saipan an epidemic of dengue fever developed among the troops. After extensive aerial spraying of DDT in mosquito-breeding areas, the number of

new cases a day fell more than 80 percent in two weeks. The danger of scrub typhus in the Pacific Islands and in Burma and China was reduced measurably by the impregnation of clothing with dimethyl phthalate.

The treatment of battle neurosis progressed steadily so that between 40 and 60 percent of men who broke down in battle returned to combat and another 20 to 30 percent returned to limited duties. In the early stages of the war less than 10 percent of these men were reclaimed for any duty.

The development of methods of handling whole blood on the battlefield was a great contribution to battle surgery. Though very useful, plasma is not nearly as effective in combating shock and preparing wounded for surgery as whole blood. Blood banks were established in every theater and additional quantities were shipped by air from the United States, as a result of the contribution of thousands of patriotic Americans. An expendable refrigerator was developed to preserve blood in the advanced surgical stations for a period of usefulness of twenty-one days.

So that no casualty is discharged from the Army until he has received full benefit of the finest hospital care this Nation can provide, the medical service has established a reconditioning program. Its purpose is to restore to fullest possible physical and mental health any soldier who has been wounded or fallen ill in the service of his country.

To ensure that men are properly prepared for return to civilian life the Army established twenty-five special convalescent centers. At these centers men receive not only highly specialized medical treatment, but have full opportunity to select any vocational training or recreational activity, or both, they may desire. Men, for example, who have been disabled by loss of arms or legs are fitted with artificial limbs and taught to use them skillfully in their former civilian occupation or any new one they may select. Extreme care is taken to ensure that men suffering from mental and nervous disorders resulting from combat are not returned to civil life until they have been given every possible treatment and regained their psychological balance.

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#### THE WORK AHEAD FOR THE GENERAL AND CONVALESCENT HOSPITALS

September witnessed the all-time high in dispositions during any four-week period from the general and convalescent hospitals. The total number of patients disposed of during the month was 60,715 of whom an estimated 44,000 were overseas patients. The Surgeon General has requested continued pressure to obtain disposition of patients as soon as maximum hospitalization has been reached in view of projected release of Medical Department personnel, particularly doctors.

Patients remaining in general hospitals at the end of September totaled 166,625, a decrease of about 17,000 from the end of August. Eleven thousand of this decrease was in patients on furlough and leave, while only 6,000 was in the number of beds occupied. This reflects the continued pressure to bring patients formerly on leave or furlough into the hospitals to effect disposition as quickly as possible. Beds occupied

in general hospitals totaled over 120,000. During September, plans were completed for carrying out the closure of twenty general hospitals and three convalescent hospitals by the end of December. A survey indicated that only 6,500 patients remaining in the hospitals scheduled for closure will require transfer to other general hospitals for the completion of their treatment. These will be principally general and orthopedic surgery and neurosurgery patients. No attempt will be made to move patients who will complete their hospitalization prior to 31 December. However, it is believed that through the early transfer of the groups which will require hospitalization beyond 31 December closure of many of the hospitals in advance of that date can be accomplished.

Patients remaining in convalescent hospitals at the end of September totaled 33,888, of whom about 7,000 were on leave or furlough. The decline in the load in convalescent hospitals has been rapid because of the falling off of convalescent patients admitted direct from the debarkation ports and in the number of patients being transferred from the general hospitals. In view of this decreasing load in convalescent hospitals, a schedule of reduced capacities has been worked out, as a result of which the total capacity of the convalescent hospitals were reduced from 50,000 to 43,500 as of 1 October, with further reductions for each subsequent month.

Since VJ-day the patient load in the general and convalescent hospital system has declined steadily. It is estimated that by 31 December there will still be 109,000 patients in general hospitals and 17,000 patients in convalescent hospitals. Many of these patients will be neurosurgery, plastic surgery, paraplegic, and complicated orthopedic surgery cases requiring long periods of specialized treatment. By July 1946 it is expected that this number will be reduced to 36,000 and 7,000 respectively.

The policy of The Surgeon General, since the beginning of World War II, has been to treat patients from overseas in specialized centers located as closely as possible to their homes. The continuance of this policy during the contracture of the general hospital system will require the closing of complete hospital units in the more sparsely populated areas of the country.

Total personnel required to operate the ZI hospitals decreased by over 5,000 during September. This signified the beginning of a scheduled personnel contraction coincident with the decline in patient load. Personnel assigned decreased by over 7,000 or 2,000 more than the decline in requirements.

The successful contracture of the ZI general hospital system will require prompt transfer to convalescent hospitals of patients who no longer require general hospital care, and optimum efficiency in the reassignment and utilization of available officer and enlisted Medical Department specialists.

### **GENERAL KIRK AWARDED THE DISTINGUISHED SERVICE MEDAL**

General Brehon Somervell, Commanding General of the Army Service Forces, at a review in his honor at Ft. Belvoir, awarded the Distinguished Service Medal to Major General Norman T. Kirk, The Surgeon General. The citation follows:

"For outstanding leadership from June 1943 to September 1945 in directing the largest Medical Department in the history of the United States Army. By careful planning, efficient administration, and dynamic example he made possible extraordinary care for sick and wounded American soldiers—care which has never been equaled in any war. He supervised the selection of qualified medical specialists who were assigned to posts stretching from the forward areas to general hospitals in the zone of the interior, and combined their exceptional talents with a prompt evacuation system to achieve unprecedented results. Under this able guidance, every effort was made to utilize the newer methods of medical and surgical treatment and to develop new techniques. His plans for the care of battle casualties and outstanding efforts to prevent disease among the troops resulted in an enormous reduction in mortality and morbidity. Bearing tremendous responsibilities, General Kirk accomplished his trying task in a distinctly superior manner, thereby making a major contribution to the success of American arms."

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### **COOPERATION WITH RESEARCH COUNCIL ON IMPROVEMENT OF ARTIFICIAL LIMBS**

An intensified program for the improvement of artificial limbs has been undertaken by the Army in coordination with the National Research Council, which last February, through its Committee on Prosthetic Devices, started work on this problem cooperating with the Veterans' Administration, Navy, Army, National Bureau of Standards, Federal Security Agency, and engineers from some industries. The Committee on Prosthetic Devices will continue its study along the same lines, but the Army will give further cooperation in additional phases of the program, conducting its research work at general hospitals which are amputation centers. The aim of both projects is the general improvement in the quality of artificial limbs, more standardization of parts, and the facilitation of production and fitting.

The phases of the program to which the Army will devote its efforts include: (1) further development and improvement of knee assembly and ankle assembly; (2) investigation of materials for producing a naturalistic hand or for covering a mechanical hand; (3) evaluation of usefulness of plastics in sockets or limb section; (4) broad study of metals and alloys used in fabrication of artificial limbs; (5) investigation of



fabrics and techniques of manufacture and fitting for prostheses at or below the ankle; and (6) production of a motion picture record of the Army amputation and prosthetic program.

Private industry will play an important part in this program. The Committee on Prosthetic Devices contracts with individual concerns for basic research, which is carried on in the laboratories of the company contracted. The Army through its amputation centers will afford every possible means of cooperation. The War Department hopes to broaden this aspect of the project by enlisting the help of more industrial concerns which have the laboratory facilities to engage in such work.

On 21 September there had been about 14,000 amputees in Army general hospitals in this country since the beginning of this war. Five percent of these cases were soldiers who have two arms or legs or one arm or one leg missing, nine were triple amputees, and two men were quadruple amputees. About 95 percent are men who have suffered the loss of one limb.

---

#### PERSONNEL QUALIFIED TO SERVE THE PHYSICALLY HANDICAPPED

The National Society for Crippled Children and Adults, Inc., 211 West Wacker Drive, Chicago 6, Illinois, is establishing a central agency for all personnel qualified to serve the physically handicapped. This society invites registration by qualified persons in the listed and related categories.

Physicians specializing in physical medicine and orthopedic surgery.

Technicians: Occupational therapy, physiotherapy, medical stenography, dietetics, and industrial nursing.

Speech correctionists.

Physical educators.

Teachers of arts and crafts.

Teacher of trades.

Testing psychologists.

Clinical psychologists.

Guidance specialists.

Medical social workers.

Social case workers.

It is requested that all applicable commissioned and enlisted personnel eligible or soon to become eligible for release be informed of this invitation.

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#### REASSIGNMENT OF NURSES

Frequently, Army nurses who indicate a preference to stay in the Corps for the "duration and six months" request assignment to a specific post or station. With thousands of nurses returning from overseas, in redistribution centers, in separation centers, as patients in hospitals, and on temporary duty from overseas assignments, it is necessary to assign nurses where they are needed. Consideration can be given to individual requests only when it is possible to meet service needs.

### DEVICE TO IMPROVE THE CARE OF PATIENTS IN DOUBLE HIP SPICA CASTS

Patients in double hip spica casts are a problem in matters of nursing, personal hygiene, ward management, comfort, and the general mental and physical welfare of the patient. These problems hinge mostly around the difficulty of lifting and turning the patient. If the patient could be turned or his position shifted easily, these problems would be solved, and pressure sores

could be prevented by frequent, easy change of pressure. Lieut Colonel Shattuck W. Hartwell, M.C., reports that a satisfactory device to accomplish this is now available and in successful operation.<sup>1</sup> The only special patient requirement is a well-fitting, strong cast, with a good body portion. The device may be suspended from any available support over the center of the patient's bed, by any rope or cable strong enough to support 300 lb. The device consists primarily of a specially bent bar or pipe with leg supports near one end and with pulley and sling at the other end, so arranged that when

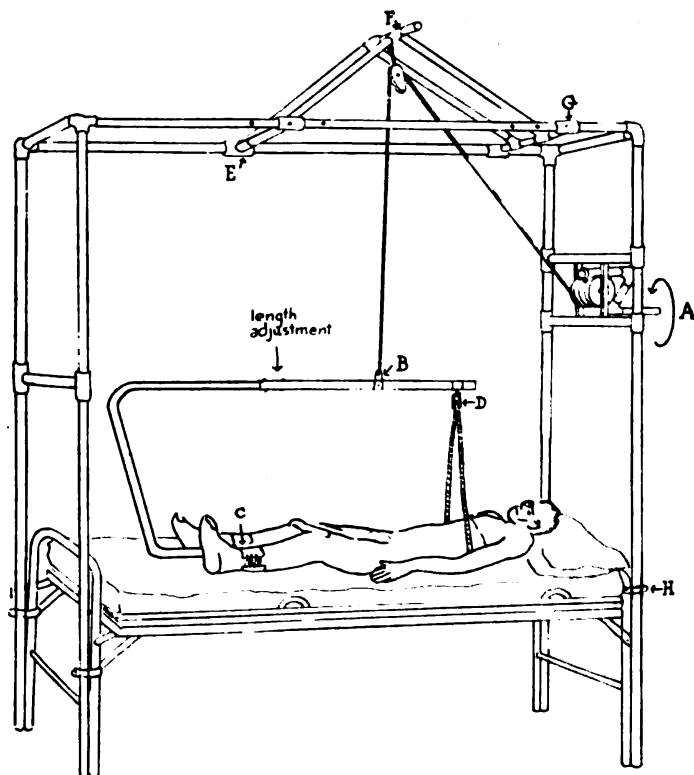


FIGURE 1. (A) Hand crank turns bomb winch to elevate patient. (B) Position on bar determines balanced or selected head or foot elevation. (C) Collar on axis bar and (D) pulley permit patient to turn himself or to be turned about his own central axis. (E, F, and G) Elevation and proper placement of suspending pulley over patient and bed permit elevation of patient without pendulum action; this device allows the supporting framework to be carried through ordinary doorway while providing adequate height of suspension. (H) Any suitable clamp. (I) Bar length adjusted by threads.

elevated it holds the patient off the bed and permits patient and cast to turn, or be turned about the central axis of the patient's body. The relations of patient to cast or of limbs to body are in no way affected by this turning, except as the pressure points occasioned by gravity are shifted as the cast and patient are turned.

1. The device was invented by Eldon A. Horne of Muskegon Heights, Michigan, and has been patented by him.

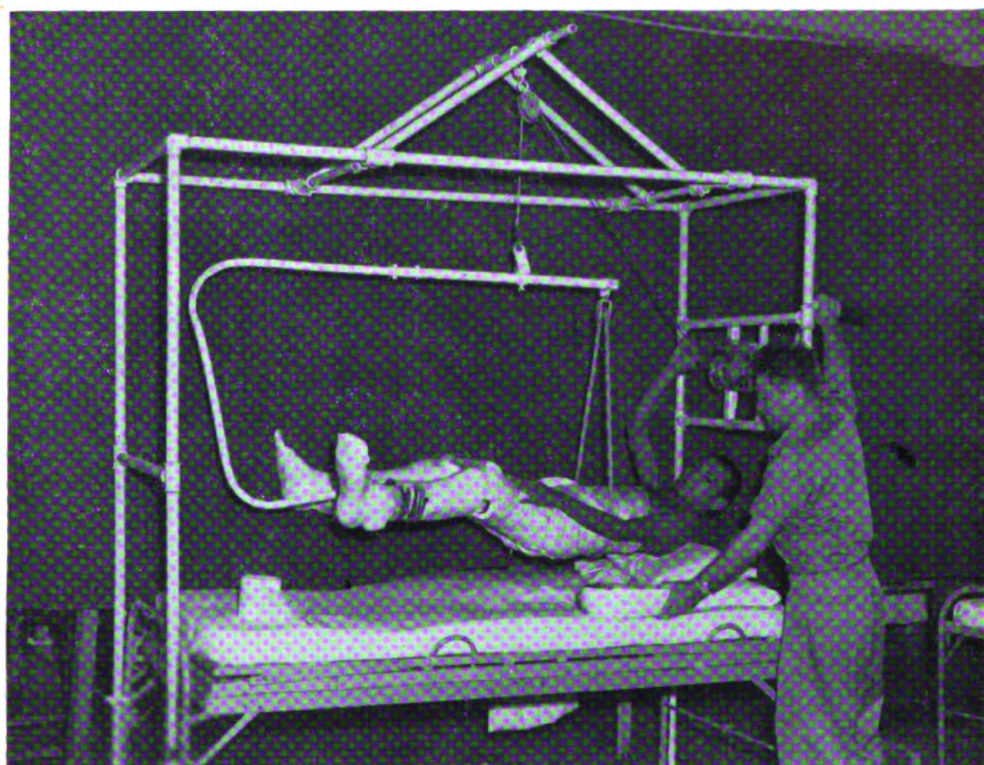


FIGURE 2

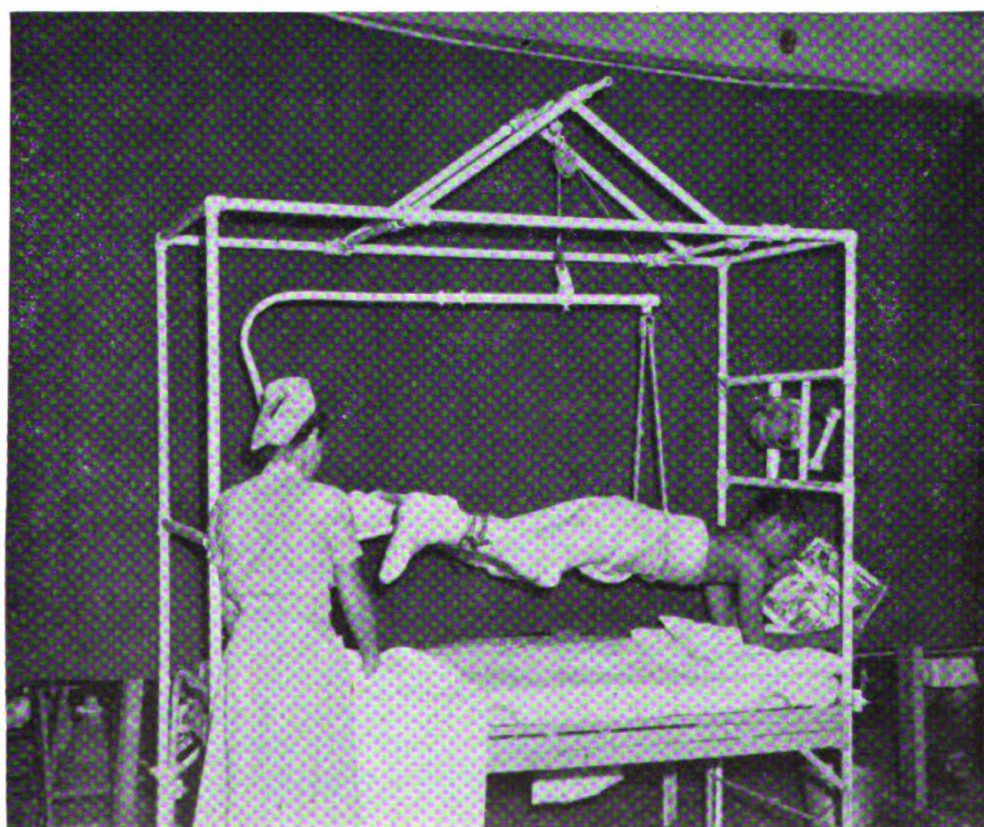


FIGURE 3



By means of the device, the patient may be suspended indefinitely, comfortably supported in his cast and by pillows and may lie on either side at will, turn completely over, or lie in any position within the 360 degrees of rotation.

The pictures show the device in use and the means we have used to support it. The support may be placed over any hospital bed much as a Balkan frame. In this case, a bomb winch from a wrecked bomber serves as the easily operated hoist and cable.

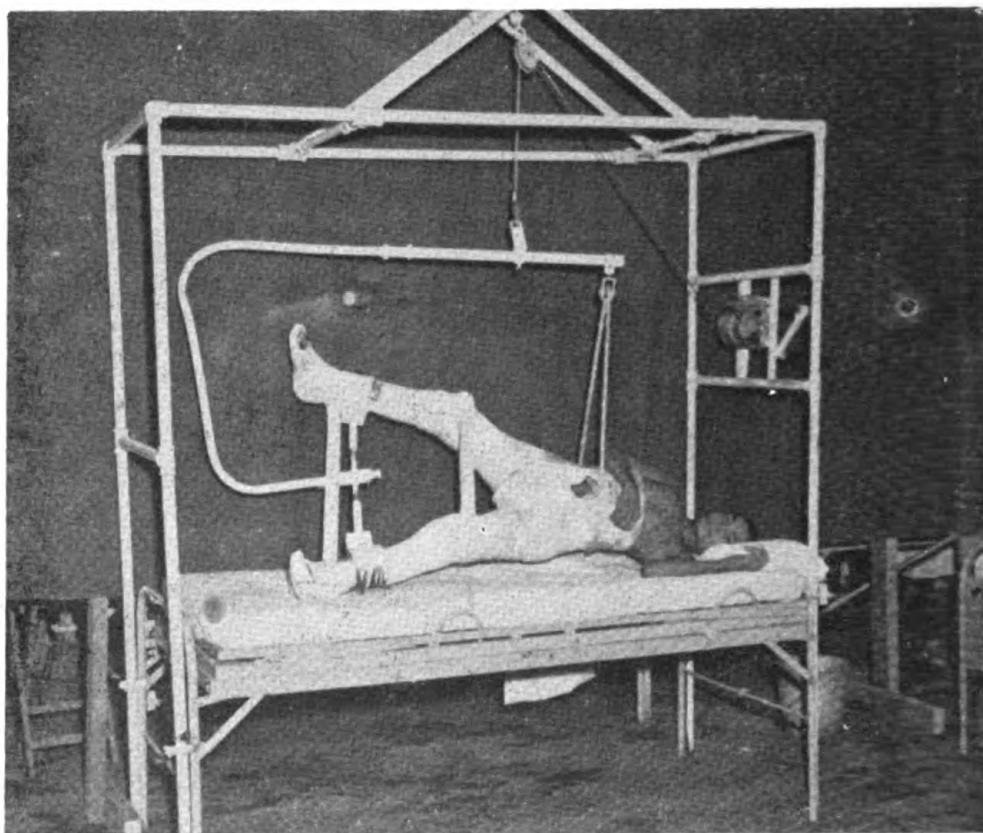


FIGURE 4

A small offset chain hoist might serve as well, or a block and tackle with a high ratio. Where available, an electric hoist with electric control switches operated by the patient himself may be used. This has been successfully used in civilian practice. It makes special attendance by nurse or wardman entirely unnecessary.

#### DEMOBILIZATION OF NURSES

Twenty-five thousand nurses will have been separated from the Army Nurse Corps by 31 December, which will bring the strength of the Corps to 32,000. Many nurses who are being separated have expressed a desire to remain in the service and have wondered why they have been unable to obtain information concerning the Regular Army. Pending enactment of legislation

that will determine the size of the peacetime Army, requirements for the Army Nurse Corps cannot be estimated.

Meanwhile the nurse who wishes to be considered for the peacetime service should submit a statement of interest to The Adjutant General. Nurses filing a statement of interest will be given priority consideration for appointment in filling the Army Nurse Corps quota.

---

#### QUANTITATIVE METHODS FOR THE EVALUATION OF HOOKWORM INFECTIONS

The common laboratory procedures for the diagnosis of hookworm infection, such as the simple smear examination and the zinc sulfate flotation technique, provide only a rough evaluation of the probable number of worms harbored even when few or many eggs are found. As such examinations usually are reported simply as positive or negative, medical officers in charge of patients have no idea whether a few or a thousand worms are present. In making a decision about re-treatment, it is important to know whether enough worms are still present to warrant retaining the patient for further anthelmintic treatment. It is generally accepted that infections of fewer than twenty-five worms are not likely to cause significant damage.

Quantitative information on the size of hookworm infections is highly desirable also for evaluating the efficacy of a course of treatment. In surveys of groups of individuals such information is essential to obtain a true picture of the hookworm problem.

The simplest method for estimating the size of hookworm infections is to count the number of eggs in a measured sample of feces. The Stoll egg-counting technique is the procedure usually employed for this purpose:

Four gm. of feces are placed in a 125-cc. Erlenmeyer flask marked to indicate a 60-cc. level. Decinormal (0.4 percent) sodium hydroxide is added up to the 60-cc. mark. A few small glass beads are added; the flask is closed with a rubber stopper and shaken until the feces are thoroughly comminuted. If the fecal specimen is hard, the flask should be allowed to stand for several hours to allow adequate disintegration. When the feces have been thoroughly comminuted, the flask is shaken thoroughly, and a 0.15-cc. sample of the suspension is *immediately* withdrawn into a graduated 1-cc. serologic pipette. The sample is discharged onto a clean glass slide (preferably 38 by 75 mm. in size) and covered with a 22- by 40-mm. cover glass. With a mechanical stage the preparation is examined systematically under a 16-mm. lens and all eggs are counted, including those in the rim of fluid outside the edge of the cover glass. The total number of eggs counted is multiplied by 100 to obtain the approximate number of eggs per gram of feces. This figure is divided by a factor (45 for *Necator americanus*, 120 for *Ancylostoma duodenale*) to obtain an estimation of the approximate number of worms harbored. Although considerable variation may occur in the egg-laying capacity of worms in individual cases, this method of estimating worm burdens is supposed to be accurate within 10 to 20 percent for a series of cases.

The collection of worms passed following treatment is another procedure which yields information on the amount of

infection harbored. It is very useful in evaluating the efficacy of treatment. Also, since the eggs of *Ancylostoma* and *Necator* are indistinguishable, collection of specimens is necessary to determine the species of hookworm which is present.

In making a quantitative collection of worms, it is essential that all fecal specimens passed during the twenty-four-hour period following treatment be saved. Because of posttreatment purgation, the stools are usually liquid and the isolation of the worms is not difficult. The fecal specimens are washed through an 18-mesh wire screen. The material remaining on the screen is transferred to a large Petri dish and covered with water. With the dish placed on a dark surface and with good overhead lighting, the round, slender, white worms (usually 1 to 2 cm. long) may be easily recognized and counted. *Ancylostoma duodenale* is distinguished from *Necator americanus* by the presence of characteristic teeth in the buccal cavity and by the structure of the bursa and spicules in the male worms. Identification of specimens should be made by an experienced parasitologist.

#### AVOIDANCE OF TREMATODE INFECTIONS IN THE ORIENT

In addition to schistosomiasis japonica (see *The Bulletin*, March 1945, page 23, and War Department Technical Bulletin TB MED 167, June 1945), a number of other trematode diseases are widespread in the Orient. Precautions must be taken, therefore, to avoid infection, especially among troops in Japan, Korea, and China. Larval stages of the parasites occur in fresh water fish, crabs, crayfish, and certain edible water plants, and are infective if ingested in food that has not been thoroughly cooked. Native "delicacies," particularly those containing raw flesh from fresh water fish or Crustacea, should be scrupulously avoided.

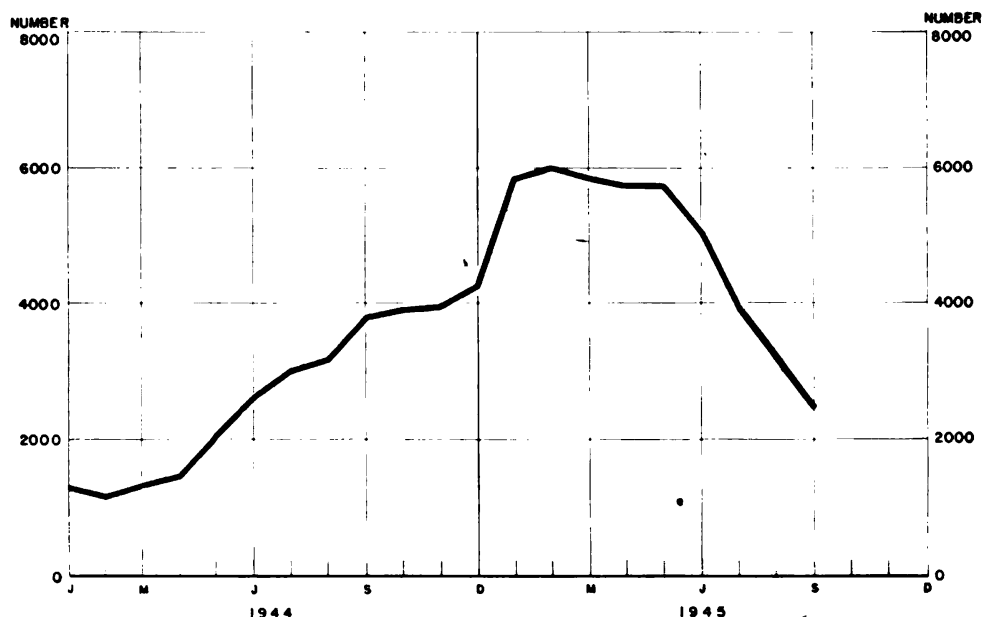
Among the trematodes of importance as human parasites in the Orient are the lung fluke, *Paragonimus westermani*, the infective stage of which occurs in fresh water crabs and crayfish; the liver fluke, *Clonorchis sinensis*, the infective stage of which occurs in a variety of fresh water fish; and *Fasciolopsis buski*, an intestinal fluke, the encysted larvae of which are attached to the water caltrop, water chestnut, and other edible aquatic plants. Human infection with these trematode parasites occurs in scattered foci throughout the Orient, being found particularly in places where the eating habits of the people favor the acquisition of infection. Like other flukes, they require a snail host for development of the early larval stages. Consequently, their occurrence is also dependent on the prevalence of certain species of snails. Infections caused by these flukes should not be a problem among troops if proper precautions are observed in regard to the eating of foods from native sources.

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From the Tropical Disease Control Division, Surgeon General's Office.

### HOSPITAL ADMISSIONS IN UNITED STATES FOR RELAPSES OF MALARIA ACQUIRED OVERSEAS

The chart shows the monthly number of hospital admissions in the United States from January 1944 through September 1945 for relapses of malaria infections acquired overseas. Such admissions did not become a significant problem until the latter part of 1943, when increasing numbers of men began to return from the tropical theaters either as patients or for



temporary duty or rotational reassignment. During 1943, the total number of hospital admissions in the United States for relapses of malaria infections acquired overseas was 5,275. The number of such admissions increased in 1944 more than fivefold to 28,150, and in the first six months of 1945 the total was 30,420.

The peak of admissions for malaria relapses in the United States was reached in February 1945, since when the number has declined steadily and at an increasingly rapid rate in recent months. It is believed that return of troops now in the tropical theaters will not appreciably affect this trend. Although some of the divisions heavily seeded with malaria in the early days of combat have not yet returned to this country, a large proportion of the original personnel already has been replaced and returned. Units and casual replacements which entered the Pacific-Asiatic areas after the middle of 1943 are not expected to show the high rates of infection experienced by the earlier groups. With a few exceptions, the relapses which have occurred in the United States have been due to *Plasmodium vivax*.

**EXERCISE MACHINE FOR AMPUTATIONS BELOW THE KNEE**

An exercise machine for the purpose of extending flexion contracture in amputations below the knee has been designed at Percy Jones General Hospital by Staff Sergeant Burt R. Becker, who has been doing special remedial work among patient amputees. The new machine has already been found to shorten the time previously needed to extend knee joints by manual treatment, contracture table, or wedge cast and thus will eliminate much work of the remedial staff. Heretofore, the patient's remedial work on a flexion contracture has largely depended on the number of remedial workers avail-



able. At best, the manual treatment or treatment by contracture table has been limited to once or twice a day. With this machine, the patient himself may use it many times daily while he is confined to bed.

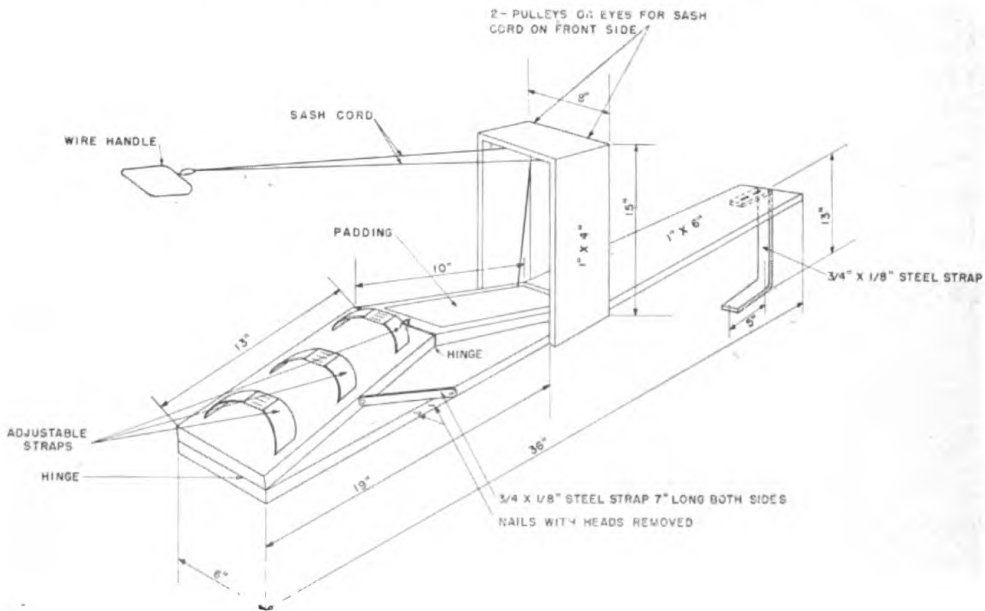
Major Harry E. Robbins, M.A.C., reports that an important observation, made by orthopedic surgeons who have seen the machine in operation, is the common tendency among patients to discontinue pressure on the knee joint with their first sensation of pain. As the patient has complete control over the machine, he does not overdo. While a maximum stretch can be placed on the hamstring group by this machine, less pain seems to be experienced by the patient in the stump. This is probably due to the fact that the stump is supported on a pad, which more evenly distributes the area of pressure on the stump. The machine has been particularly valuable in the treatment of postural contractures resulting from prolonged casting, low pain threshold, and fibrosis on posterior of leg and knee joint.

An added feature is the simplicity of its construction, which consists of a base piece of hardwood 36 inches long, 6 inches wide, and  $\frac{3}{4}$  inch thick. Hinged to the rear of this base is the thigh extension board, 13 inches long, 6 inches



wide, and  $\frac{3}{4}$  inch thick. The thigh is strapped to this board by three  $1\frac{1}{2}$ -inch web belts with buckles. Hinged to the forward end of the thigh extension board is the stump extension which is 10 inches long,  $3\frac{3}{4}$  inches wide, and  $\frac{3}{4}$  inch thick. This board is tapered toward the forward edge in order to clear the pulley-supporting bridge. The stump extension board is padded with orthopedic felt covered by leather to facilitate cleaning. The pulley-supporting bridge, 19 inches back of the base piece and screwed to its side, is 15 inches high, 4 inches wide, and 8 inches across the base piece. Two pulleys are placed on forward edge of the pulley-supporting frame, spaced to conform to the width of the stump extension piece at its forward end. Two sash cords are knotted at the end and drawn through the stump extension, upward through the pulleys and back for a length of  $1\frac{1}{2}$  feet, with wire handle attached.

The thigh extension piece is adjustable to conform to the degree of contracture and is locked to the desired angle by means of two strap iron pieces, one at each side. Three or more



screws with heads removed are sunk into each side of the base piece beginning  $10\frac{1}{4}$  inches from the rear and spaced  $1\frac{1}{4}$  inches apart. A hole drilled into the base end of the iron straps slips over the screw ends, thus locking the thigh extension piece at the desired angle. A strap iron hood is screwed to the forward end of the base piece. It is 13 inches long after bending two 4-inch end sections to 90 degrees. This holds the entire machine down against the pull of the stump extension piece. It will conform to standard Army hospital beds. With the thigh firmly strapped onto the thigh extension piece, the pa-

tient pulls on the sash cord by means of the wire handle, thus raising the stump extension and stretching the flexion contracture. The specifications are shown in case some other amputation center desires to construct a similar machine.

#### MODIFICATIONS OF METHOD FOR STAINING PARASITES IN THICK BLOOD FILMS

Two slight modifications of the original technique of Field's method for staining parasites in thick blood films have enhanced its value at the 9th Service Command Medical Laboratory, according to Sergeant Adriano D. Alicna. The first of these has been a preliminary treatment, for three to ten minutes, of those slides which have dried in air for a week or more prior to staining with an immersing solution of formalin (5 percent), acetic acid (1 percent), and distilled water as recommended for preparing thick blood films for Giemsa's or Wright's stains.<sup>1</sup> This seems to aid in dissolving the red cells without disturbing the parasites. The second has been the restaining of the slide for one second in Solution A (containing methylene blue and azure B) after the completion of the original technique.<sup>2</sup> This makes for a clearer differentiation of chromatin granules and platelets.

1. War Department Technical Manual TM 8-227, Methods for Laboratory Technicians, 17 October 1941, p. 358.

2. Wartman, William B.: Notes on Field's Method of Staining Parasites in Thick Blood Films, Army M. Bull., 68:173-177, July 1943.



Americans take over a German quartermaster, medical, and ordnance dump 1,800 feet underground in a salt mine near Fulda. The cars are loaded with clothing and medical supplies for issue to displaced persons of Allied nations in Germany. 5 May 1945. Signal Corps photograph.

## TYPING SERA FOR THE GENUS SHIGELLA

As an aid to more accurate and rapid identification of organisms causing bacillary dysentery, absorbed sera adapted to a slide agglutination technique have been prepared by the Army Medical School. These have been issued for more than a year in place of the *Shigella* agglutinating sera which were used with a tube technique.

The preparation of the *Shigella* typing sera is based on the studies of Boyd, who demonstrated that each type of dysentery bacillus stimulates the formation of a distinctive specific antibody as well as a variable number of group specific antibodies which reacted with other types. These cross-reacting antibodies are removed by absorption, leaving a monovalent or type specific serum agglutinating only its homologous type. The sera are standardized to give a reaction on a slide in five minutes or less. In addition to monovalent sera, three polyvalent sera consisting of pooled monovalent sera used in a preliminary screening test are issued. Their reactivity is shown in table I.

The suspension of organisms to be used for typing may be obtained from a twenty-four-hour Russell's slant (showing an alkaline slant and acid butt without gas), derived in turn from a twenty-four-hour rectal swab culture on SS agar. A provisional identification may thus be made in most instances within forty-eight hours of receipt of the specimen. Determination of motility and confirmatory biochemical studies should be made, as well as serologic identification, as certain fecal organisms outside the genus *Shigella* infrequently may agglutinate in these sera.

TABLE I

*Types or species for which specific Shigella sera are available*  
(Reactions in polyvalent sera A, B, and C and biochemical reactions)

	Poly A	Poly B	Poly C	Lactose	Mannitol	Xylose	Dulcitol	Rhamnose	Salicin	Sorbitol	Indol
<i>Sh. paradysenteriae</i> "V"	+	+ or -	+ or -	-	+	-	-	V-	-	-	V-
<i>Sh. paradysenteriae</i> "W"	+	+ or -	+ or -	-	+	-	-	-	-	-	V-
<i>Sh. paradysenteriae</i> "Z"	+	+ or -	+ or -	-	+	-	-	V	-	+	V
<i>Sh. paradysenteriae</i> Boyd 103*	+	+ or -	+ or -	-	+	-	-	V	-	L	+
<i>Sh. paradysenteriae</i> Boyd P119	+	+ or -	+ or -	-	+	-	-	-	-	-	+
<i>Sh. paradysenteriae</i> Boyd 88†	+	+ or -	+ or -	-	+	-	V	-	-	L	-

Prepared by the Research Section, Division of Bacteriology, Army Medical School.

TABLE I—Continued

	Poly A	Poly B	Poly C	Lactose	Mannitol	Xylose	Dulcitol	Rhamnose	Salicin	Sorbitol	Indol
<i>Sh. paradysenteriae</i> Boyd 170	—	+	+ or —	—	+	L	—	—	—	L	—
<i>Sh. paradysenteriae</i> Boyd P288	—	+	+ or —	—	+	—	L	—	—	—	—
<i>Sh. paradysenteriae</i> Boyd D1	—	+	+ or —	—	+	L	L	—	—	L	—
<i>Sh. paradysenteriae</i> Boyd P274	—	+	+ or —	—	+	—	V	—	—	V	—
<i>Sh. paradysenteriae</i> Boyd D19	—	+	+ or —	—	+	L	V	—	—	L	—
<i>Sh. paradysenteriae</i> Boyd P143	—	+	+ or —	—	+	L	—	—	—	+	+
<i>Sh. sonnei</i> (smooth)	+	+ or —	+ or —	L	+	V	—	+	—	—	—
<i>Sh. sonnei</i> (rough)	+	+ or —	+ or —	L	+	V	—	+	—	—	—
<i>Sh. dysenteriae</i>	—	—	+	—	—	—	—	—	—	—	—
<i>Sh. ambigua</i>	—	—	+	—	—	—	—	+	—	V	+
<i>Sh. sp. Sachs</i> type Q 771	—	—	+	—	—	—	—	—	—	L	—
<i>Sh. sp. Sachs</i> Q 902	—	—	—	—	—	—	—	L	—	—	+
<i>Sh. sp. Sachs</i> type Q 1030	—	—	—	—	—	—	L	—	—	L	—
<i>Sh. sp. Sachs</i> type Q 1167	—	—	—	—	—	—	—	—	—	L	—
<i>Sh. sp. Sachs</i> type Q 454	—	—	—	—	—	—	—	—	—	L	—
<i>Sh. rabaulensis</i> ‡	+	+ or —	+ or —	—	—	L	—	—	—	L	+
<i>Sh. paradysenteriae</i> Lavington†	—	—	—	—	+	+	—	—	—	+	+
<i>Sh. alkalescens</i> type I§	—	—	—	—	+	+	L	L	—	L	+
<i>Sh. alkalescens</i> type II§	—	—	—	V	+	+	—	V	V	V	+
<i>Sh. madampensis</i> §	—	+ or —	—	L	+	V+	—	V+	—	+	+
<i>Sh. ceylonensis</i> §	—	—	—	V	+	V	V	+	—	+	+

Key to biochemical reactions:

+ Positive in 24 hours.

— Negative in 21 days.

L Negative in 24 hours; positive in 2 to 21 days.

V Variable (+, —, or L).

V+ Usually +.

V— Usually —.

\*A few strains are mannitol minus and xylose plus.

†Newcastle and Manchester varieties are serologically identical to Boyd 88. They may produce a small amount of gas. The Newcastle variety is mannitol variable.

‡Serum not supplied.

§Organisms require heating before testing. Frequently present in normal feces. Pathogenicity questionable.

||Rarely produces gas.

Two *Shigella* typing kits are issued. (1) A comprehensive kit containing the three polyvalent and all the specific sera is available to service command, general medical, and army laboratories. A supplementary kit of eight additional specific sera has

recently been made available to the same laboratories. (2) A simplified kit, containing the three polyvalent sera, a trivalent VWZ serum, and specific sera for *Sh. paradysenteriae* type Boyd 88, *Sh. sonnei*, *Sh. dysenteriae* (Shiga's bacillus), and *Sh. ambigua* (Schmitz bacillus), is available to hospital laboratories equipped for bacteriologic work. Complete technical directions are included with each kit. By means of the simplified kit a rough identification of a large number of types can be made, and some of the more frequently appearing types can be identified precisely. Organisms which cannot be typed with this kit should be forwarded to the nearest laboratory equipped with the comprehensive kit. Since the sera will not all be used at the same rate, individual sera rather than entire kits should be requisitioned for replacement. Kits and individual sera may be requisitioned from the Director, Army Medical School, Army Medical Center, Washington 12, D. C.

Table I shows in the first column the specific sera present in the comprehensive and supplementary kits. The first sixteen types listed are well known and many have occurred with important frequency in the Army. Of the Sachs types mentioned,<sup>1</sup> Q 771 and Q 1167 have been of greatest significance. They have been isolated from Army personnel in North Africa and Italy.<sup>2</sup> The *Sh. arabinotarda* A reported by this Army laboratory corresponds to the Sachs Q 771 and the *Sh. arabinotarda* B, to the Sachs Q 1167. Two types are listed for which sera are not furnished. The first of these, *Sh. rabaulensis*, originally described in 1936 in Australia<sup>3</sup> following isolation in Rabaul has recently been isolated with some frequency from Army personnel only in Puerto Rico. Strains have been studied since 1942 in Puerto Rico and at the Army Medical School.<sup>4</sup> The Naval Medical School has investigated strains isolated in Saipan and Samar, and from individuals returned from Brazil and Chile.<sup>5</sup> The second, *Sh. paradysenteriae* Lavington, termed in some reports, *Sh. etousa*, was often found in the European Theater of Operations, Italy, and North Africa and was considered a newly identified pathogen.<sup>6</sup> The reactions of polyvalent sera A, B, and C, which are supplied with both kits, are shown in columns 2, 3, and 4. The remainder of the table indicates the biochemical reactions of the various types or species, all of which are nonmotile, non-gas-forming, dextrose and arabinose fermenting, gram-negative rods, which do not ferment inositol and do not utilize sodium citrate.

1. Sachs, H.: Report on Investigation into Characteristics of New Types of Non-Mannitol-Fermenting Bacilli Isolated from Cases of Bacillary Dysentery in India and Egypt, J. R. Army M. Corps, 80:92-99, Feb. 1943.

2. Christensen, W. B., and Gowen, G. H.: Arabinose-Fermenting Bacterium of Lactose-Negative, Mannitol-Negative Shigella Group, J. Bact., Balt., 47:171-176, Feb. 1944.

3. Report to the Council of the League of Nations on the Administration of the Territory of New Guinea, from 1 July 1936 to 30 June 1937.

4. Seastone, C. V., Dammin, G. J., Weller, T. H. (to be reported).

5. Communication from Lieut. Commander L. A. Barnes, Naval Medical School.

6. Communications from the 1st and 15th Medical General Laboratories, U. S. Army (to be published).

## THE VIRUS OF POLIOMYELITIS

While the virus of poliomyelitis can be identified only by its ability to produce experimental poliomyelitis in a susceptible animal, it has other fairly distinct properties. One of the smallest of the filtrable viruses, its size is estimated at about 10 to 15 millimicrons. In comparison with many bacteria, it is quite stable, remaining viable at icebox temperature in aqueous suspensions of feces for months and in pieces of infected spinal cord stored in 50 percent glycerin for years. Although it can survive in weak solutions of phenol and in high concentrations of ether, it is readily destroyed by oxidizing agents such as hydrogen peroxide and potassium permanganate, by ultraviolet rays, and by heating for short periods to a temperature of 55° C. The resistance of the virus of poliomyelitis to chlorine has not been accurately determined; probably the amount of chlorination adequate for killing enteric bacteria in water may not suffice to destroy it.

This virus has highly neurotropic tendencies and a limited host range. For the most part it is pathogenic only for certain primates—monkeys, chimpanzees, and man. With some strains, adaptation to rodents has been successful in that the eastern cotton rat has been infected and subsequently the virus has been passed in mice. In all of the susceptible species, whether in man, monkeys, or mice, this virus exerts a peculiarly selective and destructive action on the anterior horn cells of the spinal cord; while other parts of the central nervous system are invaded, the damage wrought there is not so serious.

As with other neurotropic viruses, a number of different strains have been described. Appreciation of this multiplicity of strains in poliomyelitis is important when it comes to an estimate by neutralization tests of immunity to this disease, both in animals and in man. Such tests, as yet, are not very practical, nor has it been possible to demonstrate specific immunologic reactions for clinical use by means of precipitin or complement fixation tests, or cutaneous tests such as are used in other virus diseases. While this has seriously limited the study of human immunity in poliomyelitis, there is reasonable hope that such tests may be developed in the near future.

Something is known about the *extra-neural* distribution of this virus within the human body. The virus is present in the oropharynx during the first week of the disease; but it is more readily demonstrable in the feces and for a longer period of time—six or eight weeks from onset. It may also be found in the intestinal canal many days prior to the development of myelitis. In healthy carriers the virus has been detected both in the oropharynx and the feces. In fatal human cases at autopsy, besides in the spinal cord and brain, the virus has been detected in the pharyngeal wall, but much more readily

Prepared by Dr. John R. Paul, director, Commission on Neurotropic Virus Diseases, Army Epidemiological Board.



in the intestinal wall and its contents. It is pertinent to note that when injected either sub- or intracutaneously into monkeys or chimpanzees this virus subsequently gains access to the intestinal canal and is excreted in the stools of these animals, either with or without the obvious production of myelitis in the inoculated animal.

How the virus actually enters the human body in order to localize eventually in these sites has not been determined. Such penetration presumably could occur through at least three portals: the nasal mucosa, the oropharynx, or the skin. While the first was accepted for many years as the most likely, now the upper nasal mucosa at least seems unlikely, so far as the olfactory bulbs or their nerves are concerned, in acting as neuro-pathways to the brain. This is because of the almost universal failure to find lesions in olfactory bulbs in human autopsies, whereas such lesions are characteristically found in the monkey when the disease is induced experimentally by instillation of the virus into the nares. Certain of the more susceptible varieties of monkeys can be infected by all three of these routes, as well as by other routes. Chimpanzees can be infected by feeding the virus or injecting it under the skin. Man is known to have been infected accidentally by subcutaneous inoculation of the virus.

Considered in a general way, the epidemiological implications which these three portals suggest are: If the nasal mucosa is the main portal of entry of the virus in man, this suggests that the infection is air-borne or droplet-borne, as in influenza or the common cold. If the oropharyngeal portal is the main one, it suggests that the virus contaminates objects which find their way into the mouth and thus the infection might be food-borne or water-borne, like paratyphoid fever or typhoid fever. If entry by way of the skin is important or even common, it suggests that the infection might be insect-borne, or that the virus might be rubbed into an injury. These three explanations do not cover the whole list of possibilities. It remains for future work to determine how these possibilities fit in with the general epidemiological picture.

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#### PSYCHIATRIC TESTIMONY BEFORE COURTS-MARTIAL

The recent War Department Technical Bulletin TB MED 201, entitled "Psychiatric Testimony Before Courts-Martial" was prepared jointly by the Neuropsychiatry Consultants Division and representatives of The Judge Advocate General's Department. The purpose is to outline the duties of a psychiatric medical officer as a witness in a courts-martial case. This bulletin defines the legal standard of mental accountability in accordance with military law and outlines the proper methods of psychiatric examination and the basic requirements of expert testimony.

**ACCOMPLISHMENTS OF THE ARMY DENTAL CORPS**

Since Pearl Harbor, the Army Dental Corps has accomplished the following:<sup>1</sup>

Sittings .....	105,000,000
Fillings .....	71,500,000
Extractions .....	16,500,000
Dentures .....	2,600,000
Denture repairs .....	800,000
Fixed bridges .....	210,000
Prophylaxis .....	8,700,000

As a result of the dental requirements of the early Selective Service program from 1940 to 1941, which required the recruit to have three serviceable opposing natural masticating teeth and three serviceable opposing natural incisors, 8.8 percent of the first 3,000,000 examined were rejected. Dental defects were the leading cause for rejection, with eye defects second and mental and nervous defects third. The dental requirements for entrance in the Army were lowered twice in 1942 in order to meet the need for men in the military service, and finally the only disqualifying factors were severe jaw malformation or malignancies. In addition to the rehabilitation of more than 1,500,000 men for the Army by prosthetic appliances, many thousands of additional men have been made available or maintained through the 71,500,000 fillings which have been inserted.

The Army Dental Corps from 1 July 1944 to 30 June 1945 replaced 65 percent more teeth (by fixed bridges and dentures) than had been extracted.

More than 800,000 men have had their dentures repaired, rebased, or reconstructed because of breakage or tissue changes of the oral cavity. The repair, rebase, or reconstruction requirement has increased 450 percent from 1940 to 1945 and now averages 3.5 per 1,000 per month.

A method of fabricating an artificial eye in synthetic resin has been accomplished as a result of research being jointly conducted by the dental and ophthalmologic services. To date more than 5,000 acrylic eyes have been inserted. The dental service has also been active in devising and perfecting the technique associated with plastic ears, noses, and chins.

These accomplishments represent only a part of the overall dental services, duties, and responsibilities which have been delegated to the Corps.

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The National Board of Dental Examiners will hold its next sessions for the examinations of candidates in Part 1 and Part 2 on 14 and 15 January and on 22 and 23 April, 1946, in schools where there are five or more candidates. Applications should come through the office of the dean. For further information, address Gordon L. Teall, D.D.S., Secretary, Box 71, Hiawatha, Kansas.

1. These figures include work done through September 1945. July, August, and September figures are projected.



#### USE OF DDT IN PLAGUE CONTROL AT CASABLANCA\*

Plague was reported as the cause of death of a civilian worker in the port warehouse area of Casablanca, French Morocco, on 21 July 1945, and within a few days several additional civilian cases occurred in the same part of the city. For the protection of American and Italian service units and French military, naval, and civilian personnel employed in the area, a meeting was held to plan a program for control of the outbreak. In addition to invoking the international anti-plague measures for ports, restriction of the area to essential personnel, and immunization of individuals likely to be exposed, it was decided to precede the rodent destruction program with applications of DDT in the area to kill any fleas that might leave dead rats.

A malaria survey detachment experienced in the use of DDT was selected to do the work. A 5 percent solution of DDT in kerosene was applied with knapsack sprayers to floors and the lower portion of walls in barracks, offices, warehouses, trucks, and two cargo ships moored to the dock. A 10 percent DDT dust was applied to the clothing of personnel required to enter the area. With a rotary blower, dust was applied to places inaccessible to spray, such as under buildings and in rodent burrows. Local personnel were trained in methods of application of DDT so that they might be prepared to repeat the applications if necessary.

It is not possible to evaluate accurately the part played by DDT, but, according to latest reports, the plague control program as a whole was completely effective, since no further cases occurred.

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#### INFLUENCE OF NATURAL WATERS ON THE EFFECTIVENESS OF DDT AS A MOSQUITO LARVICIDE

Suggestions have come from the field to The Surgeon General's Office that the chemical constituents in natural waters might influence the effectiveness of DDT as a mosquito larvicide. To test this possibility, studies were carried out by the Fourth Service Command Laboratory at Fort McPherson, Ga. The kill of early fourth instar *Anopheles quadrimaculatus* larvae and of third instar *Aedes aegypti* larvae in various test waters was compared to that in a standard water. For *A. quadrimaculatus* larvae the standard water was distilled water raised to a pH of 8.0 with sodium carbonate; for *A. aegypti* larvae it was distilled water with a pH of 6.8. The standard amounts of DDT used were 0.0015 and 0.03 parts per million for *A. aegypti* and *A. quadrimaculatus*, respectively. These amounts of DDT killed from 70 to 100 percent of larvae in forty-eight hours in the standard water.

The test waters consisted of thirty-six samples of natural

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\*From the Tropical Disease Control Division, Surgeon General's Office.

waters obtained from various locations in the Fourth and Eighth Service Commands and also synthetic waters made by adding to distilled water varying amounts of single chemicals commonly found in natural waters. An attempt was made to test natural waters with widely different chemical compositions. The findings in the laboratory were confirmed by tests made in the field.

The conclusion reached from the studies was that no material in solution in natural waters interfered with the forty-eight-hour kill of mosquito larvae by DDT provided that the proper amount of DDT for the particular species of mosquito was applied.

#### VENEREAL DISEASE RATES

Recent trends in Army venereal disease rates are shown in the following table:

*Rates per 1,000 per annum*

	1944	1945							
		Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.
USA	33	47	43	43	43	43	44	46	53
SWPA	7	5	8	40	84	96	97		
ETO	35	48	45	48	46	62	105	136	155

It is noteworthy that the sharp rise in rates in the European Theater took place after VE-day. Likewise, in the Pacific, the marked increase in the rate occurred as the fighting in the Philippines diminished and there was more opportunity for exposure. The Army rate in the United States has also risen since VE-day and a further post-VJ-day increase is anticipated. The reasons for these increases are related to the following factors: postcombat "letdown" and increased leisure, exposure to populations with high venereal disease rates, improved therapeutic procedures resulting in diminished fear of infection, and many other factors. In the Army in the United States the increased rate is due primarily to infections acquired by returnees during the 30- to 45-day furlough period after reporting to reception stations and assembly points.

These recent increased rates forecast the extent of the venereal disease control problem to be faced by civilian agencies in the immediate future. During the war the Army has had control of over eight million soldiers and has carried out a venereal disease prevention program which has encompassed discipline, compulsory educational procedures, provision of prophylaxis, isolation and treatment of infected soldiers, and furnishing of contact information to civilian health agencies. In the next year several million soldiers will have been dis-

charged, all in the age group with the highest expected incidence of venereal disease. The Army has taken steps to assure that the number of men discharged with infectious venereal disease will be held to a minimum. Civilian agencies must now be prepared to accept the major responsibility for the increased venereal disease burden by providing control programs of optimum effectiveness. Failure to do so will almost certainly result in increased civilian rates.

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#### **COPPER SULFATE METHOD FOR HEMOGLOBIN DETERMINATION IN BLOOD DONORS**

The copper sulfate method uses a solution of copper sulfate with a specific gravity of 1.052, equivalent to 12.3 gm. of hemoglobin as determined by the Evelyn photoelectric cell method. Only donors whose test drop of blood continues to sink after entering the solution are considered acceptable. About 150,000 hemoglobin determinations were made by this method of rapid approximation. Errors in technique favor rejection rather than acceptance of donors, and it is more accurate than the Tallqvist method.

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Abstract of article by Captain C. M. Zukerman, M.C., submitted through The Surgeon General's Office.

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The blood chemistry room in the laboratories of a station hospital on Guadalcanal, 1944. Signal Corps photograph.

## ANNUAL MEETING OF LIBRARY CONSULTANTS

The Association of Honorary Consultants to the Army Medical Library on 5 and 6 October held its second annual meeting in Cleveland, Ohio, where the Branch Army Medical Library is located. About forty of the eighty-six consultants were present. The various committees—executive, building, acquisition, historical medicine, and endowments and grants—reported their recommendations. The consultants visited the binding and repair studio in which more than fifteen hundred rare and ancient books are repaired annually or rebound in the best African leather. Several thousand of the more than fifteen thousand rare books which were in a dilapidated condition have been restored.

At the opening session, Dr. John F. Fulton, Dr. Winfred G. Leutner, president of Western Reserve University, and Dr. Howard Dittrick, donor and curator of the Dittrick Medical Museum, welcomed the members. A program was presented in the auditorium of the Allen Memorial Medical Library on "The History of the Rare Book Binding Program," by Mr. Thomas J. Holmes; "Rare Books and Librarianship," by Dr. Pierce Butler; "Medical Book Selection in the Army," by Brigadier General Hugh J. Morgan. The Association re-elected Dr. John F. Fulton, president; Dr. Chauncey D. Leake was elected vice-president; Colonel Harold W. Jones, secretary-treasurer, and Major General George F. Lull to the Executive Committee. Colonel Harold W. Jones, who has just retired as director of the Army Medical Library, was presented with an engraved silver tray. The new director of the Army Medical Library is Colonel Leon L. Gardner. After adjournment, the members attended a reception at the dedication of the new Dittrick Museum.

## TRAINING FILMS

*Schistosomiasis (Snail Fever) (Film Project 10947).* This disease entity is described by this interesting sound film, which contains details based on scenes taken where the disease is most prevalent. All essential aspects of the disease and its prevention are covered in such a manner as to make them readily appreciated by both professional and nonprofessional personnel. (Running time: 12 minutes)

*The Army Nurse (Misc. Film 1173).* This film shows the work, courage, and devotion to duty of the American Army Nurse. It shows the nurse in her many duties throughout the chain of evacuation with units actually supporting combat troops. It serves well to orient all individuals on the traditions of the service; on the duties, responsibilities, and value of the nurse to the service; and on the desirability of serving with the Army Nurse Corps during peacetime. (Running time: 18 minutes)

### TRAINING SCHOOLS CLOSED

With the graduation of the twenty-sixth class on 17 October 1945, the Medical Administrative Corps Officer Candidate School, Carlisle Barracks, Pa., was placed on a stand-by basis. For the first time in over four years, the training of selected enlisted men to receive commissions as second lieutenants in that corps was suspended. Plans for the resumption of such training will be made at such time as the needs of the Army warrant.

The School for Physical Reconditioning Instructors, A.S.F.T.C., Ft. Lewis, Washington, closed on 29 September 1945. Begun at Camp Grant, Illinois, in 1944, the school qualified more than 1,300 enlisted men as physical reconditioning instructors (MOS 283) for duty in the program conducted in Army hospitals. A six-week course gave intensive training in physical exercises, elementary kinesiology, recreational leadership, and group psychology.

The Army School of Roentgenology, Memphis, Tennessee, was inactivated on 29 September 1945. The training of enlisted men at this installation had been discontinued during the preceding year, but courses for medical officers had been carried on up to the time of its closing; 585 officers were given the twelve-week course. Colonel A. A. de Lorimier, former commandant, has gone to an overseas assignment.

No additional classes will be entered in the courses for physical therapists conducted at several general hospitals. The last of the current classes will complete the "school" phase of their training on 10 February 1946 and will receive their commissions when the "applicatory" phase has been completed on 10 August 1946.

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### VETERINARIANS NEEDED

Veterinarians are needed in the Meat Inspection Division, U. S. Department of Agriculture. The starting salary is \$2,320 per annum in the P-1 grade. A veterinarian whose services are found satisfactory is eligible for promotion to the P-2 grade within six months. The salary range in this grade is from \$2,980 to \$3,640 per annum with automatic promotions of \$110 per year from the minimum of \$2,980, provided his services are satisfactory. His experience before or while in the Army may be sufficient to gain an appointment at the P-2 grade with a starting salary of \$2,980. Those interested in Government employment with the Meat Inspection Division should fill out Standard Form No. 57, which may be secured by writing the Personnel Division, Production and Marketing Administration, or from your local Civil Service office, and forward it to the Chief Personnel Officer, Meat Inspection Service, U. S. Department of Agriculture, Washington 25, D. C.

### REFRESHER COURSES

A number of medical and dental schools are now offering postgraduate courses designed especially for returning medical and dental officers and other courses of a more general nature. In some schools short intensive courses, varying from one to several weeks, are offered, as well as graduate courses of one year's duration in certain specialties and courses in preceptorships in the specialties.

Some dental schools are offering basic refresher courses in full denture construction, in full denture prosthesis, operative dentistry, periodontia, and endodontia, as well as a course for the general practitioner. While space is not available to publish details concerning these courses, *The Bulletin* will assist officers, on request, to find the type of refresher course which they desire. Schools which have recently reported refresher courses to *The Bulletin* are: The George Washington University School of Medicine, 1335 H St., NW., Washington 5, D. C., and the University of Pennsylvania School of Dentistry, 4001 Spruce Street, Philadelphia 4, Pennsylvania, to which, it is suggested, interested officers write direct.

### APHASIC LANGUAGE DISORDERS

The Neuropsychiatry Consultants Division recently held a conference of clinical psychologists from representative neurological centers to discuss methods of study and management of aphasic language disorders. A report of the conference has been sent to all service command neuropsychiatry consultants and to all neurological centers. The report forms a supplement and elaboration of TB MED 155 and gives more specific details of examination and retraining of aphasics. Special attention is given to the pretraumatic personality and to personality changes following injury. Specific instructions are given for retraining in oral expression, auditory comprehension, reading, and writing. The use of collateral agencies in rehabilitation is suggested. Criteria are listed for determining hospital benefit. A limited number of copies of this report will be available to interested medical installations.

### DISTINGUISHED SERVICE MEDALS OF HONOR

The Theodore Roosevelt Distinguished Service Medals of Honor for 1945 will be awarded to Dr. Vannevar Bush, director of the Office of Scientific Research and Development and president of the Carnegie Institution of Washington, in recognition of "distinguished service in the field of science"; to Cordell Hull, formerly Secretary of State, and to General of the Army George C. Marshall, Chief of Staff. According to *Science*, the presentation dinner, to be held under the joint auspices of the Roosevelt Memorial Association and the Women's Roosevelt Memorial Association, will mark the eighty-seventh anniversary of the birth of Theodore Roosevelt.

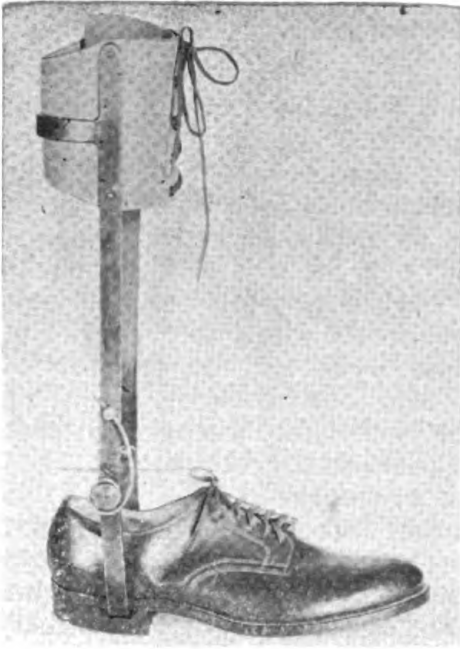


FIGURE 1

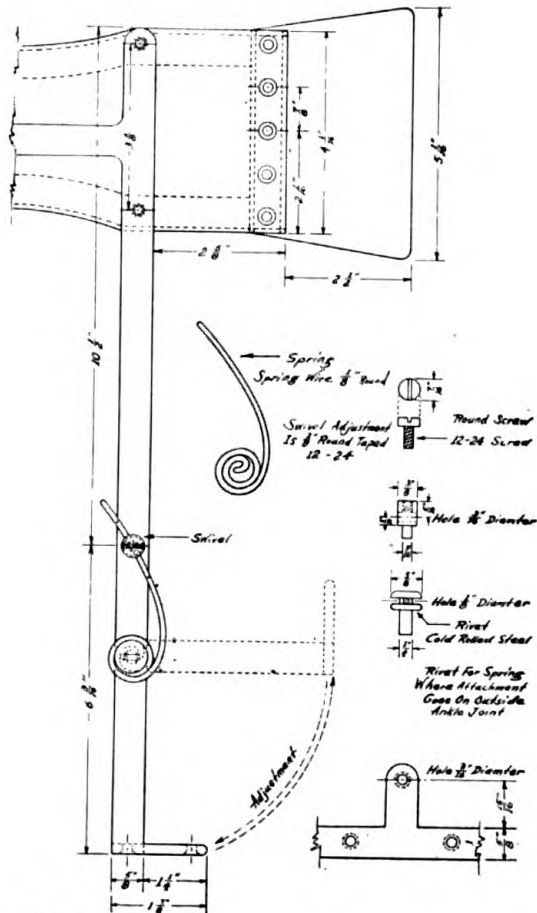
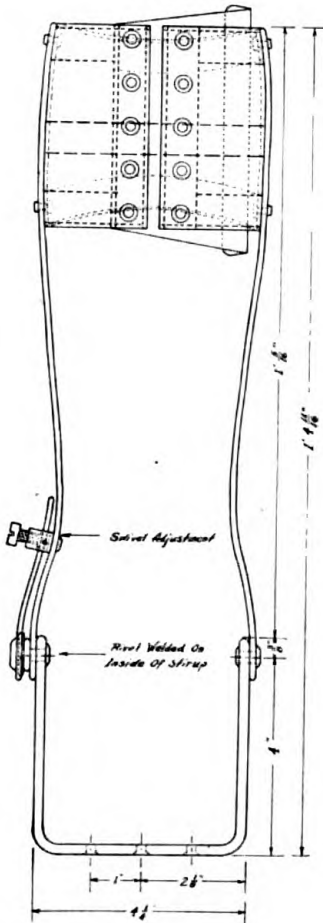


FIGURE 2

## NEW SPRING DROP FOOT BRACE

A new spring drop foot brace has been devised in the orthopedic shop, Fitzsimons General Hospital, by Technician Third Grade Ray J. Hall, Medical Department, and reported to The Surgeon General's Office by Captain A. Jackson Day, M.C. The chief advantage of this brace (figures 1 and 2) is that the amount of tension on the spring is adjustable so that it can be changed during the recovery of paralyzed muscles and can also be altered for the individual patient, since some patients require less pressure than others. In addition, the spring device is small and does not interfere with the patient's trousers.



### PROJECTOR FOR USE IN HOSPITAL WARDS

The cabinet type projector illustrated has been designed especially for showing films to bed patients as a part of the convalescent-reconditioning program. Authority will be granted for issue of this equipment to general, regional, and convalescent hospitals (ZI), with allowances as follows: general hospitals—one per each 450 authorized beds or major portion thereof; regional hospitals—one per each 500 authorized beds or major portion thereof; and convalescent hospitals—one per each 1,000 authorized beds or major portion thereof.



FIGURE 1. The projector.

This projector (AN/TFQ-5) is not intended to replace the standard 16-mm. projectors now issued to A.S.F. hospital film libraries, but should be considered supplementary equipment for on-the-ward film showings. It will facilitate the showing of regularly scheduled film programs to bed and ward patients under daylight conditions. The compactness of the projector makes it adaptable for use on wards with a capacity of 2 to 8 beds; and its automatic features will reduce the required number of trained projectionists to a minimum. The Surgeon General's Office will arrange for automatic delivery of this machine to hospitals. Information and instructions regarding operation of the projector are contained in War Department Technical Bulletin TB MED 188, 31 July 1945.

### POSITIONS OPEN

The Surgeon General's Office has received from the following institutions requests for the names of discharged, qualified individuals interested in an appointment to the positions indicated:

1. Peter Bent Brigham Hospital, 721 Huntington Avenue, Boston 15, Massachusetts—second assistant superintendent who must be a physician not over thirty years of age.
2. The Massachusetts Hospital School for Crippled Children, 412 Beacon Street, Boston, Massachusetts—a supervisor and medical director who has had experience in managing hospitals.

It is suggested that applicants write direct to the addresses given.



# VALUE OF ANTERIOR-OBLIQUE ROENTGENOGRAMS IN DIAGNOSIS OF PRIMARY ATYPICAL PNEUMONIA

Studies made during the past ten years indicate that the lower lobes are the most frequent sites of pulmonary infiltration in primary atypical pneumonia. The left lower lobe is most commonly involved; the right lower lobe is next in order of frequency of location. Together, the lower lobes are involved in from 60 to 80 percent of the cases. Lesions confined to the hilar regions, the upper lobes, or the middle lobe occur in less than 15 percent, while multiple-lobe involvement is found in about 10 percent of the cases. The distribution of pulmonary infiltration in primary atypical pneumonia is similar to that found in pneumococcal pneumonia.

The clinical diagnosis of primary atypical pneumonia cannot always be readily made. Two factors are believed to be largely responsible for this discrepancy: (1) the characteristic lag between the onsets of roentgenographic signs and of auscultatory signs in most cases, and (2) the failure to employ the anterior-oblique technique in diagnostic roentgenography, particularly when infiltration at the lung bases is suspected.

Although it is common knowledge that the physical signs appear late in the course of primary atypical pneumonia after the development of a positive roentgenogram, the extent and relationship of this occurrence is not always appreciated. Studies<sup>1</sup> of the Commission for the Investigation of Atypical Pneu-

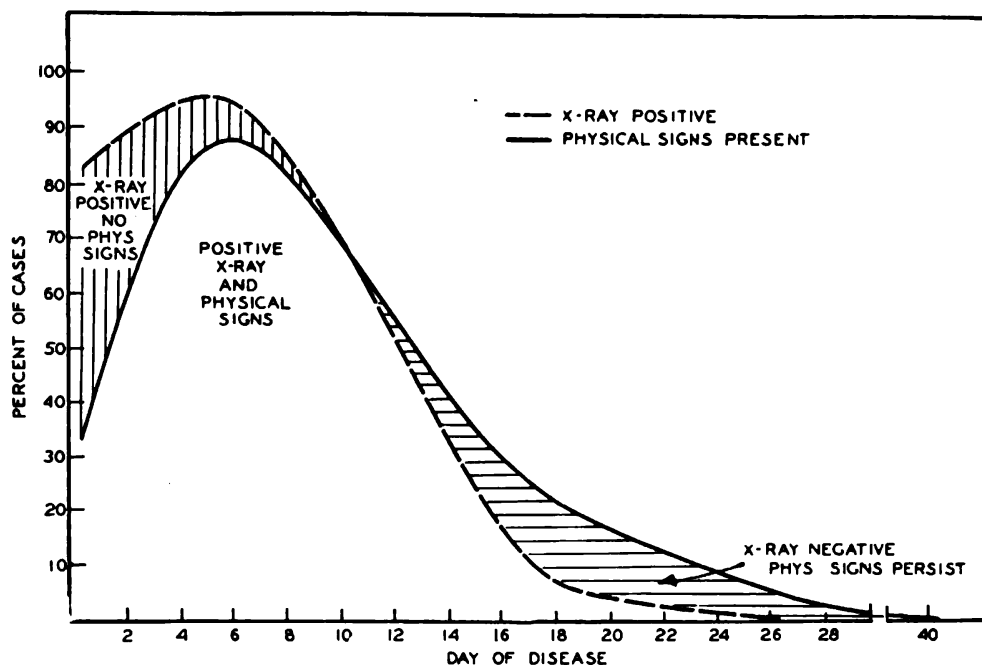


FIGURE 1

1. Dingle, J. H., Abernethy, T. J., Badger, G. F., Buddingh, G. J., Feller, A. E., Langmuir, A. D., Rueggsegger, J. M., and Wood, W. B., Jr.: Primary Atypical Pneumonia, Etiology Unknown, *Am. J. Hyg.*, 39:67-128, Jan. 1944.

monia and Other Respiratory Diseases at Camp Claiborne, Louisiana, showed that on the first day of disease about 80 percent of patients had positive roentgenograms and only 33 percent had physical signs (figure 1). Between the first and fifth days of disease, the percentage of patients showing both physical signs and radiographic evidence of pneumonia became nearly the same. The experience of the Commission on Acute Respiratory Diseases at Fort Bragg has, in general, corroborated the earlier findings. The practical importance of these observations is that unless diagnostic roentgenography is employed early and pulmonary signs diligently looked for continuously, some cases of primary atypical pneumonia may be overlooked.

The posteroanterior technique is the accepted routine in chest roentgenography, and in the diagnosis of primary atypical pneumonia this standard procedure is satisfactory in the majority of cases. Not infrequently, however, this technique fails to disclose areas of infiltration behind the diaphragm at the bases or in the sulci. Use of the lateral projection may be of value in localizing areas of infiltration and in differentiating circumscribed infiltration from interlobar pleuritis.<sup>2</sup>

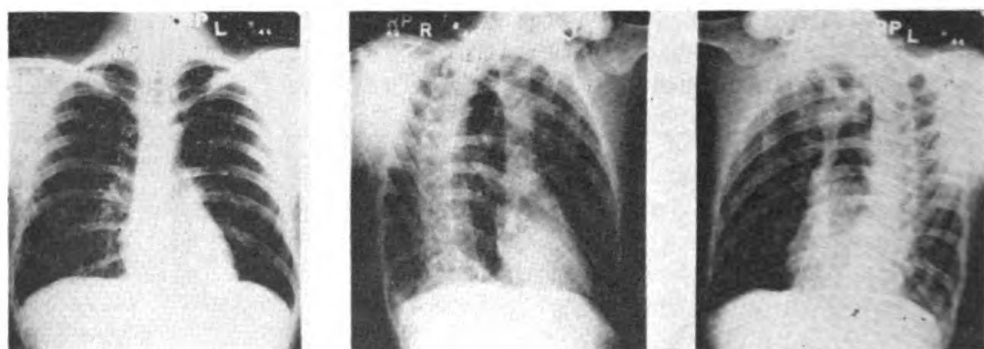


FIGURE 2

During the course of experimental studies on the production of primary atypical pneumonia in human volunteers, 6 instances out of 19 were encountered in which the employment of the right and left anterior-oblique technique either disclosed areas of infiltration at the lung bases which were not visualized by the posteroanterior exposures, or delineated areas in their entirety which were only partially shown by the standard procedure. One such example of the former is shown in figure 2. Observation of subsequent cases of atypical pneumonia naturally acquired has amply confirmed the value of these additional exposures, particularly in instances where lesions of the left lower lobe were suspected.

2. Crysler, W. E.: Roentgenographic Manifestations of Atypical Pneumonia of Unknown Etiology, *Am. J. Roentg.*, 51:280-291, Mar. 1944.

#### CLINICAL FELLOWSHIPS IN MEDICINE

To assist in providing opportunities for postgraduate education in internal medicine for medical officers discharged from the armed forces, the American College of Physicians has established a number of Clinical Fellowships in Medicine for 1946. These fellowships are available for physicians honorably discharged from the armed forces who are Fellows, Associates, or prospective candidates for Associateship in the College. They are designed to provide opportunity for advanced clinical training in internal medicine or in any of its special fields. They are limited to a term of one year, may start at any time during 1946, and are not renewable. Assurance must be provided that the applicant will be acceptable in the clinic in which he has chosen to work. The fellowship stipend will ordinarily be from \$1,800 to \$3,000, depending on individual circumstances. Application forms will be supplied on request to the American College of Physicians, 4200 Pine Street, Philadelphia 4, Pa., and may be submitted, in duplicate, at any time. Decision with respect to award of a fellowship will be made and the applicant notified of the action taken as soon as possible after receipt of the application.

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#### MANAGEMENT OF COMMON EYE DISORDERS

The U. S. Army Air Forces, Washington, D. C., has published a manual (AAF Manual 25-0-6) outlining the diagnosis and treatment of eye disorders in military personnel and designed to supply medical officers with a conservative routine for the management of cases commonly encountered. While this manual was prepared by two outstanding ophthalmologists in the Air Forces, its application is particularly for those who have not had much specialized training in ophthalmology. The manual is published for the information of medical officers and is not a directive. It is recommended, in the foreword, that when possible all but simple eye conditions be referred to an ophthalmological consultant. The manual is not, therefore, to be construed as restricting qualified specialized medical personnel from deviating from recommendations therein. Requests for copies should be submitted to Headquarters, A.A.F., Washington, D. C., Attention: The Air Surgeon.

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#### COMBAT FATIGUE

About 90 percent of the combat exhaustion cases in the European Theater of Operations prior to the collapse of Germany returned to duty as a result of prompt and skilled handling, according to a report by a commission of civilian psychiatrists appointed by the Office of Scientific Research and Development at the suggestion of The Surgeon General. The commission spent eleven weeks in the theater studying conditions in the field. High quality of personnel, better methods

and techniques, and the fact that psychiatrists are getting to their patients more rapidly are some of the reasons that combat fatigue was treated more successfully in this war than shell shock was in the last war, the commission reported. Battle-weary soldiers are treated by various methods. Sedation, narcosynthesis, hypnosis, and the new technique of group psychology are some of the treatments observed in Europe by the commission. Results of group psychotherapy were reported as most encouraging. The report stresses the fact that the presence of combat exhaustion is no indication of lack of courage. It points conclusively to the fact that soldiers do reach a point at which their systems can undergo no more.

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#### THE TECHNIQUE OF GROUP PSYCHOTHERAPY

In July 1945, thirty hours of recordings were made of group psychotherapy sessions at Welch Convalescent Hospital and at the Fort Knox Rehabilitation Center. Certain passages were selected from these recordings and reproduced in quantity with comments on the technique. The sessions which were recorded were spontaneous and unrehearsed.

A set of the ten records has been distributed to all of the psychiatric centers, convalescent hospitals, and the service command record libraries. They are intended as a supplement to War Department Technical Bulletin TB MED 103, to assist in training psychiatrists and their assistants in methods of group psychotherapy.

Comments on the various sequences included in the recordings were necessarily brief. To obtain the most value from these recordings, each sequence should be discussed by the group listening to them so that good points and errors may be thoroughly analyzed. It is not sufficient merely to listen to the records. An outline of what was contained in the various records was distributed with the records. Those installations which did not receive a set of the records may borrow them from the service command record libraries.

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#### LIBRARY NOTES

Colonel Leon L. Gardner has been appointed director of the Army Medical Library, Washington, D. C., to succeed Colonel Harold W. Jones, M.C., who will be relieved from active duty on 1 January 1946. Colonel Gardner graduated from the Army Medical School in 1924. He recently returned from overseas, having served in the China-Burma-India Theater and later was in command of a general hospital in France. Colonel Jones graduated in medicine at Harvard in 1901 and from the Army Medical School in 1906. Captain Francis R. St. John, acting the librarian since September 1944, has returned to the New York Public Library as chief, Circulation Department, from which library he came to the Army Medical

Library in November 1943. Sergeant Ralph R. Shaw, special assistant to Captain St. John, has returned to the position which he held before entering the Army—that is, librarian of the United States Department of Agriculture. Sergeant Shaw, a graduate of Western Reserve University, is the author of books on library procedures.

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#### MEDICAL BATTALION CITED

The 261st Medical Battalion has been cited for courageous performance of duty under exceptionally hazardous conditions. Landing on Normandy, France, in support of assault troops on D-day, in the face of intense artillery fire and within sight of enemy forces, this unit set up tentage and collected and evacuated the wounded. By H plus 8 hours, clearing stations were established and major surgery was being performed. This unit handled over 75 percent of all casualties sustained on First Army beaches during the first ten days of the Normandy Invasion. The officers and men of the 261st Medical Battalion worked day and night, with no sleep whatever, under enemy artillery fire and air raids. Undaunted by flak which constantly pierced the operating tents, all personnel continued working with disregard for their own safety in order more speedily to render aid to the wounded. From the first critical and uncertain hours on 6 June through 18 July 1944, this unit cared for thousands of casualties, including every single patient evacuated to the United Kingdom from the Cherbourg sector. The valorous and unfaltering devotion to duty and individual gallantry of the members of the 261st Medical Battalion contributed immeasurably to the successful liberation of Europe and are in keeping with the highest traditions of the armed forces of the United States.

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#### AWARD TO MEDICAL BASE DEPOT COMPANY

The Commanding General, X Corps, U. S. Army, has awarded the Meritorious Service Unit Plaque to the 74th Medical Base Depot Company for superior performance of duty in exceptionally difficult tasks in Mindanao, Philippine Islands, from 17 April to 30 June 1945. Although greatly hampered by lack of transportation, the unit was set up and began receiving supplies immediately. In spite of heavy rains necessitating a continuous program of ditching and draining, this small company erected tents for storage and organized their stocks into an efficiently operating depot, issuing supplies to all units and forwarding emergency supplies overland and by air and water. When change in location was directed, the depot closed, again built and improved its own area, and was oper-

ating within ten days. Through the entire period the organization proved its superior caliber by the tireless efforts made by all personnel in keeping supplies rolling toward the front. Wholeheartedly cooperative in spirit, united in maintaining a cheerful and enthusiastic attitude at all times, the 74th Medical Base Depot Company established an outstanding record and contributed materially to the continued success of our forces in the Southwest Pacific Area.

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#### THE 42D GENERAL HOSPITAL CITED

The 42d General Hospital was the first medical unit to reach Honshu island, Japan, docking at Yokohama on 30 August, aboard the first American ship to enter this harbor since 7 December 1941.

The hospital's initial assignment was the medical processing of prisoners of war from the Sixth and the Eighth Army areas. Setting up in a former customs warehouse in Yokohama, the unit bathed, clothed, fed, and examined 17,531 prisoners of war. While this was in progress teams of doctors, nurses, and corpsmen went to prison camps in other parts of the island, entering these areas far in advance of the occupation troops.

In mid-September, after the completion of the prisoner of war assignment, the unit moved to Tokyo to occupy St. Luke's International Medical Center, which, built primarily by American vision and money, was one of the foremost medical centers of the Orient. It had become shabby with war. Even before the U. S. Army medical unit completed cleaning the hospital and installing its own equipment, the wards were receiving patients. It will be used exclusively for the treatment of U. S. military personnel. A commendation from General MacArthur for its first month of service in Japan was extended the 42d General Hospital on the day it opened its new installation in Tokyo.

The unit, commanded by Colonel George H. Yeager, Baltimore, Md., has been in the Pacific for forty-two months, one of the first general hospitals to leave for overseas duty after Pearl Harbor. It has a complement of 83 Army nurses under the direction of Lieut. Colonel Grace Dick, Lonaconing, Md.

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#### AWARD OF MEDAL OF HONOR TO AID MEN

The War Department has announced the award of the Medal of Honor to the following medical aid men:

TECHNICIAN FOURTH GRADE LAVERNE PARRISH, medical aid man with Company C, 161st Infantry. In the early hours of 24 January, his company, crossing an open field, encountered intense enemy fire and was ordered to withdraw to the cover of a ditch. Technician Parrish observed two wounded men still in the field. Without hesitation he crawled forward under enemy fire and brought both men to safety. He then administered aid to 12 casualties in the same field, which was still raked by hostile fire. He brought three wounded men to cover. After treating nearly all of the

casualties suffered by his company, he was mortally wounded by mortar fire. The indomitable spirit and gallantry of Technician Parrish saved many lives at the cost of his own.

**TECHNICIAN FIFTH GRADE ALFRED L. WILSON**, of Fairchance, Pennsylvania, who, while serving with the Medical Detachment, 328th Infantry, near Bezange la Petite, France, on 8 November 1944, volunteered to assist as an aid man a company other than his own. When he returned to his own company, a shellburst injured a number of his comrades. While treating them, he was wounded, but refused to be evacuated. He crawled from one patient to another until loss of blood prevented his aiding further. Still refusing to be evacuated, he remained to instruct others in dressing the wounds of his comrades until he became unconscious. Corporal Wilson through distinguished devotion to duty and personal sacrifice helped save the lives of at least ten wounded men.

**CORPORAL THOMAS J. KELLY**, of Brooklyn, New York, a medical aid man of the 7th Armored Division, in recognition of his rescue of seventeen injured comrades on 5 April 1945, during the drive through Germany. Corporal Kelly made ten separate trips through enemy fire to bring out critically wounded men. During each trip he dragged a wounded man and guided a total of seven less seriously injured comrades to safety.

**PRIVATE FIRST CLASS DESMOND T. DOSS**, of Lynchburg, Virginia. Although not bearing arms, he performed so many feats of heroism on the battlefields of Guam, Leyte, and Okinawa that his name became a symbol for outstanding gallantry throughout the 77th Infantry Division. In the face of desperately dangerous conditions, Private Doss saved the lives of many soldiers.

**PRIVATE HAROLD A. GARMAN**, of Albion, Illinois. On 25 August 1944, near Montereau, France, the enemy was contesting enlargement of the bridgehead on the bank of the Seine. Casualties were evacuated in assault boats paddled by litter bearers. As a boatload reached midstream, a German machine gun opened fire. All in the boat took to the water except a wounded man who could not rise. Two other patients unable to swim clung to the boat. Private Garman plunged into the Seine and, swimming directly into a hail of machine-gun bullets, towed the boat to shore, not only saving three patients but inspiring his comrades so that additional assault boats resumed evacuation of the wounded. Private Garman's devotion may be written with great pride in the annals of the Medical Corps.

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**Monthly Medical Meeting.**—At the monthly meeting of medical officers at the Army Medical Center, Washington, D. C., 18 October, Colonel B. C. T. Fenton, M. C., discussed, "The Surgeon General's plan for the Medical Department in the Postwar Army," and Lieut. Colonel R. B. Sig-  
afoos, M. C., "Professional Training for Medical Officers of the Army."

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**Psychiatric Conference.**—The psychiatrists of the Ninth Service Command held a two-day conference at the Bushnell General Hospital on 1 and 2 October, under the leadership of Colonel Lauren Smith. The program, arranged by Colonel Olin Chamberlain, chief of the neuropsychiatric service at Bushnell, included papers by chiefs of the services of the hospitals in the Command and emphasized the therapeutic aspects of psychiatry. About thirty-five neuropsychiatrists attended the meeting.

### JOINT ARMY-NAVY MEDICAL PROCUREMENT

On 9 October 1945 the Secretary of War and the Assistant Secretary of the Navy approved the joint recommendation of the respective Surgeons General on the organization, plans, and functions of the contemplated Joint Army-Navy Medical Procurement Agency to be established at 52 Broadway, New York, the present location of the Army Medical Purchasing Office. This plan was developed under the supervision of the previously appointed director and assistant director of the joint agency who are, respectively, the Chief, Matériel Division, Bureau of Medicine and Surgery, U. S. Navy, and the Chief, Supply Service, Office of The Surgeon General, U. S. Army, by the wholehearted cooperation of their respective organizations in Brooklyn and New York.

Pursuant to this plan, the commanding officer and executive officer for the joint establishment have been appointed and are at present engaged in preparing the detailed procedures for the joint agency and the specific assignment of military and civilian personnel from both departments to the joint agency. It is tentatively planned that the joint agency may be completely functioning by 1 December 1945. Meanwhile, pursuant to previous approval, certain branches of the joint agency have already been established and are functioning, identifying items of procurement already common to both services, reconciling existing differences so as to make more items identical, preparing joint specifications covering such items and preparing a joint catalog, all of which are necessary preliminary steps toward deriving the full benefits of joint purchasing. Uniformity of nomenclature will facilitate the interchange of supplies in overseas bases and eventually may tend to effect operating economies by eliminating duplication in supply facilities during military operations.

The approval of the procurement plan has assigned fiscal responsibility to the Army with provisions for a working fund from the naval appropriation to cover the Navy's share of the expenditures of the joint agency. In preparing these plans, it has been evident that initially and for the first few months of joint operation there is a slightly increased work load, particularly in the activities already operating; however, it is equally clear that real economy and reduction of personnel will later be derived from the joint operation and will be reflected in fund requirements for succeeding fiscal years. With minor exceptions, the plan contemplated the performance of each phase of joint activity within the personnel allocated to the similar functions in the two services, with reductions to occur as rapidly as the preparatory work is accomplished. This is still true in spite of the drastic reductions in personnel being made since VJ-day.

The present plan for the joint agency covers only the procurement functions; however, the two medical supply organ-



izations are currently studying the possible economy of joint storage operations in one or two locations which, if favorable, may lead to the broader functions of joint storage and issue of medical supplies.

#### RECENT DIRECTIVES AND PUBLICATIONS

This list is intended as only a brief reference to the items mentioned. Before acting on any of them, the original communication should be read. Request for copies, when made, should be directed to the source of the communication through proper channels.

- WD Circular No. 216**  
19 July 45  
Sect. IV  
Hospital. Valley Forge and Dibble General Hospitals designated for care of service personnel who have corneal opacities that can be improved by corneal transplant or keratectomy operation.
- WD Circular No. 228**  
28 July 45  
Sect. IV  
Life Insurance. No representative of a life insurance company will be admitted to an Army post, camp, or station without submission of written evidence of prior appointment having been made with a specific individual stationed at such post, camp, or station.
- ASF, Headquarters**  
Circular No. 287  
28 July 45  
Part II, Sect. VIII  
Separation Center. Pension claims to be prepared as part of medical processing rather than at some other point in separation center processing. Sets forth instructions re filing of VA Form 526.
- ASF, Headquarters**  
Circular No. 292  
2 Aug. 45  
Part II, Sect. V  
Disinfestation. Storage and issue of HCN discoids used in disinfestation of buildings and commodities is responsibility of post engineer. Disposal outside W.D. will be made only upon approval of service command engineer, surgeon, and chemical warfare officer.
- WD Circular No. 237**  
4 Aug. 45  
Sect. I  
Purple Heart. Changes AR 600-45, 22 Sept. 1943, and provides that Purple Heart may be awarded by commanding officers of hospital centers or convalescent hospitals.
- ASF, Headquarters**  
Circular No. 300  
7 Aug. 45  
Part III, Sect. VI  
Army Retiring Boards. Administrative procedure pertaining thereto to be expedited by: (1) strict compliance with par. 3, W.D. Cir. 474, as amended; (2) by giving such cases priority for administrative handling within each headquarters; (3) by determining essentiality of an officer referred for that purpose under W.D. Cir. 109, 1945, within forty-eight hours after receipt of case by the headquarters.
- AR 40-1715**  
10 Aug. 45  
Blood Transfusion. Sets forth complete regulations re blood transfusion, including provisions re applicable statutes, records, rates authorized, reimbursement for blood withdrawn, and donation of blood by military personnel.
- ASF, Headquarters**  
Circular No. 319  
23 Aug. 45  
Part II, Sect. VII  
Discharge. Individuals inducted under AGPR-I 327.31 (23 Dec. 1944), 4 Jan. 1945, who may become eligible for discharge under existing W.D. regulations will be handled without reference to The Adjutant General for final decision.
- WD Circular No. 260**  
28 Aug. 45  
Physical Examination. All general officers ordered to Pacific, India-Burma, or China Theaters will be given physical examination as outlined in sect. I, W.D. Cir. No. 59, 1945, except as provided.
- WD Circular No. 262**  
30 Aug. 45  
Sect. III  
Overcrowding. To prevent transmission of disease, troops will be allotted 60 sq. ft. of barracks space per man whenever practicable. Where necessary to allot less than 60 sq. ft. per man, minimum standards provided by AR 40-205 will be strictly observed.

- WD Circular No. 262  
30 Aug. 45  
Sect. VI  
Scientific Periodicals. All medical periodicals of a scientific nature which are in excess of the needs of any installation within United States will be sent to Army Medical Library in accordance with instructions set forth.
- WD Circular No. 267  
5 Sept. 45  
Influenza. All Army personnel will be vaccinated with influenza vaccine during Oct. and Nov. 1945. Sets forth instructions re use of influenza vaccine.
- WD Circular No. 269  
7 Sept. 45  
Sect. IV  
Transportation and Per Diem. Provides that military personnel returning to U. S. for redeployment or reassignment, when recuperation and recovery are prescribed, will be authorized cost of transportation and per diem for all travel without troops in connection with a permanent change of station, or temporary duty to and from place of recuperation and recovery, but not while on such temporary duty.
- ASF, Headquarters  
Circular No. 343  
12 Sept. 45  
Part II, Sect. VI  
Patient-Hospital. Effective for patients arriving at debarkation hospitals on and after 1 October 1945, the special report card (W.D., A.G.O. Form 8-24), prepared for patients evacuated to United States from overseas for further observation or treatment, will be discontinued.
- WD Circular No. 283  
19 Sept. 45  
Sect. I  
Promotion. Sets forth W. D. policy for promotion of officers during demobilization period.
- WD Circular No. 287  
20 Sept. 45  
Sect. I  
Discharge. Sets forth instructions re discharge of enlisted personnel whose service records have been lost.
- WD Circular No. 292  
25 Sept. 45  
Sect. II  
Maternity Care. A woman honorably discharged because of pregnancy is eligible for maternity care during pregnancy and confinement, and for outpatient postnatal care at any Army medical installation with suitable facilities. At time of discharge unit commanders will advise such individuals of their eligibility for such care.
- WD Circular No. 296  
28 Sept. 45  
Sect. IV  
Certain Medical Corps officers on active duty are eligible for release from active duty to accept residencies or fellowships in civilian hospitals. On their release they must be replaced by a Medical Corps officer now on inactive status and serving as resident or fellow in the hospital to which the officer being released will report for postgraduate training. Prescribes detailed procedures for carrying out foregoing policy.
- ASF, Headquarters  
Circular No. 373  
3 Oct. 45  
Part II, Sect. VI  
Army Industrial Hygiene Laboratory. Discontinued at Johns Hopkins University and concurrently re-established at Edgewood Arsenal, Md., as a Class IV activity under the jurisdiction of The Surgeon General.
- WD Circular No. 305  
5 Oct. 45  
Sect. VII  
Maternity and Infant Care. Sets forth complete regulations re furnishing hospital maternity and infant care without cost to wives and infants of certain Army enlisted men and of Army aviation cadets.
- WD Circular No. 312  
11 Oct. 45  
Sect. III  
Leave. Provides that an officer authorized to grant leave of absence may grant oral permission for absence over week ends, holidays, other similar periods, and for absence during any period less than forty-eight hours at other times, except that such oral permission may not be granted at beginning or termination of ordinary leave.
- WD Circular No. 315  
13 Oct. 45  
Sect. III  
W. D. Cir. No. 398, 1944, amended to list O'Reilly and Fitzsimons General Hospitals as plastic eye centers.



Dogs of war. Signal Corps photograph.

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Part of a herd of 7,000 horses and mules captured from the German Army in the Po Valley, San Martino, Italy, 10 May 1945. Signal Corps photograph.





U. S. Army "medics" man an assault boat to evacuate wounded across the Roer River, Germany. February 1945. Signal Corps photograph.



Because of German bombings of Anzio Beachhead, Italy, it became necessary to "dig in" this evacuation hospital. The picket fence shown is covered with burlap, and earth is backed against it to form an excavation in which the hospital tent is erected. Signal Corps photograph.

## Evaluation of the Untoward Reactions Attributable to Atabrine

Army experience in all malarious theaters has shown atabrine to be extremely valuable for the suppressive treatment of malaria. Untoward reactions possibly attributable to the drug have been few, considering the large number of men who have been taking it and the long periods during which it has been given. In no instance have reactions been of sufficient consequence to warrant discontinuance of the drug in a military organization or in a geographic area. As a rule, minor unpleasant reactions, such as intestinal disturbances, which not infrequently occur within the first few suppressive doses of atabrine, disappear in a few days when the drug is continued.

Medical officers in the Southwest Pacific Area called attention, in the latter part of 1943, to a characteristic cutaneous syndrome which was occurring in soldiers who had been evacuated from New Guinea and adjacent islands. Lieut. Colonel Charles Schmitt and Major Thomas Nisbet, dermatologists stationed with general hospitals in that area, were the first to submit to The Surgeon General official reports in which they described the disease and its probable etiology. Later, similar cases were reported from all other theaters where suppressive atabrine medication was in general use as a control measure for malaria. This syndrome has been observed most frequently in New Guinea and adjacent islands and in Assam and northern Burma; in other areas only small numbers of cases have occurred.

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Prepared by the Medical Consultants Division, Surgeon General's Office.

This summary was made possible largely because of clinical studies and observations in large groups of patients which have been recorded in official reports and articles submitted to this office by medical officers in overseas theaters and in the United States. It is not possible to record the name of every individual who has contributed to our knowledge of this subject. The following is a partial list:

Southwest Pacific Area: Lt. Col. Charles Schmitt, Major Thomas Nisbet, Lt. Col. John Ambler, Major A. M. Harvey, Major A. M. Pappenheimer, Major F. B. Bang, Capt. John Maier, Major Arthur Holbrook, Major Frank McDonald, Major James Webster, Major Lawrence Katzenstein, Major D. R. Gillespie, Lt. Col. Philip Brown, Col. Maurice Pincoffs, and Dr. J. Gardner Hopkins.

Mediterranean Theater: Major Lawrence Nelson and Major Robert Buchanan.

India-Burma Theater: Capt. Clarence Agress, Major Clarence Livingood, Major James Flood, Capt. Daniel Perry, Capt. Harvey Blank, and Major Thomas Machella.

Pacific Ocean Area: Major Gerald Frumess and Capt. Herbert Lawrence.

Zone of the Interior: Capt. Erwin Epstein, Major James Bazemore, Capt. Herbert Johnson, Lt. Col. Donald Wilson, Capt. Henry Brunsting, Capt. Lawrence Goldberg, Major Richard Sutton, Lt. Col. Julius Scholtz, Major J. Rosenthal, Major Louis Dantzig, Capt. M. G. Butler, Major Robert Stolar, Major Mortimer Cantor, Capt. James Drake, Capt. Otto Hitschmann, Capt. Manuel Bloom, Capt. Frederick Becker, Major Earl Glicklich, Lt. Col. Douglas Decker, and Major Paul Reque.

This skin disease which has acquired the name "atypical lichen planus" is characterized by various combinations of the following types of lesions: violaceous and erythematous hypertrophic lichenoid papules and plaques, frequently with a rough verrucous surface; violaceous and erythematous, oozing or scaling eczematoid plaques well demarcated in some cases and ill defined in others; flat, squamous, geographic plaques on trunk, axillae, and groins similar to tinea lesions; white, sometimes-violaceous-tinged, slightly elevated mucous membrane lesions identical with those seen in typical lichen planus; oozing intertriginous dermatitis in the groins, axillae, and posterior surface of the ears; ecthymatous lesions; scaling and superficial fissuring of the lips; and scaling erythematous eczematoid dermatitis of the eyelids. In some cases, the lesions are predominantly lichenoid; in others, most of the plaques are eczematoid. Almost all patients have both violaceous, hypertrophic lichenoid plaques and some form of cutaneous eczematoid reaction. During the course of the disease, a considerable number of these patients have acute, "explosive" generalized exacerbations, manifested by oozing eczematoid dermatitis having a predilection for the flexors, groins, axillae, extremities, and neck. Such exacerbations resemble exfoliative dermatitis and a few of these patients may develop a secondary exfoliative dermatitis which is as severe as the cases of primary exfoliative dermatitis described below. The seriousness of such a state and the need for expert management of these patients cannot be overemphasized.

Usually the disease is characterized by onset of localized violaceous or erythematous eczematoid plaques on the dorsal surface of hands or feet, lateral surface of the neck, or elsewhere, followed by generalization of the lesions with subsequent appearance of the lichenoid plaques and mucous membrane lesions. The distribution of the lesions is variable. Any part of the cutaneous surface may be involved, but there is a predilection for the lower legs, forearms, dorsal surface of hands and feet, face, buttocks, lower anterior surface of the neck, genitalia, mucous membranes of the mouth, eyes, and eyelids. Residual effects and lesions which develop later in the course of the disease include: atrophy; hyperpigmentation (melanin) and depigmentation; diffuse follicular accentuation over the upper back, shoulders, and extremities; changes in the nails; moth-eaten, patchy alopecia; and marked disturbance in sweating function.

For practical purposes, it is necessary to describe along with the syndrome described above, a characteristic type of eczematoid dermatitis which also has occurred in individuals taking suppressive atabrine. This skin disease is characterized by bilateral, symmetrical, violaceous-tinged, vesicular, eczematoid, and oozing plaques involving the hands, arms, feet, legs, and sometimes other parts of the body. Secondary pyogenic



infection is common. The nail bed and skin of the nail folds are usually involved, frequently resulting in exfoliation of the nails without true suppurative paronychia. With experience, on clinical grounds, one can in most cases distinguish between this eruption and other forms of eczematoid dermatitis. Tentatively the term "Symmetrical eczematoid dermatitis" has been used to differentiate this disease from other forms of eczematoid dermatitis.

It does not seem advisable to make a sharp distinction between the so-called "atypical lichen planus" and the "symmetrical eczematoid dermatitis" syndromes. From a broad point of view, it seems that all of these patients have either a lichenoid cutaneous reaction or an eczematoid cutaneous reaction or the combination of the two types. A small percentage of the total group have lichenoid lesions alone; a larger group have a combination of lichenoid and eczematoid lesions; and a still larger group have eczematoid lesions which are not accompanied by lichenoid lesions.

The regular occurrence of specific types of cutaneous reaction, such as the lesions described above, renders it necessary to consider one or more drugs as the essential etiological factor. It is well known that some types of skin changes are more frequently attributable to drugs than are others and that certain drugs have a special capacity to produce characteristic reactions. Thus, cutaneous sensitivity to sulfathiazole usually results in skin lesions characteristic of toxic erythema, erythema multiforme, and erythema nodosum; bromides tend to produce acneiform eruptions and ecthyma-like or ulcerative dermatoses; arsenicals produce localized and generalized eczematoid eruptions and exfoliative dermatitis as well as many other types of lesions; quinine has a tendency to produce eczematoid eruptions and exfoliative dermatitis. This list could be greatly extended since causal drugs and the dermatological manifestations they produce are encountered in almost limitless numbers and varieties.

The following general principles in regard to drug eruptions are pertinent here to the lichenoid and eczematoid cutaneous reactions under discussion: (1) in the majority of drug eruptions, the untoward effects are due to a peculiar susceptibility or allergy on the part of the skin of the particular individual; (2) the cutaneous changes elicited by drugs may range from mild pruritus to severe and sometimes fatal eruptions; (3) if a drug eruption is suspected, all drugs not essential to the patient's health or life should be discontinued; (4) improvement following removal of the causal drug may not occur for several weeks; (5) many patients may have periods of refractoriness, during which exposure to the causal drug does not reproduce the symptoms; (6) it is important to examine all patients with drug eruptions for damage to the hemopoietic system, liver, and kidneys; (7) patients who have

had cutaneous reactions to drugs, especially eczematoid lesions, are likely to have similar reactions to other related drugs or even other allergens, both endogenous and exogenous; (8) skin tests usually are of little or no value in the attempt to discover the causal drug, although the use of patch tests in purely eczematous eruptions may be an exception.

In regard to the lichenoid and eczematoid reactions under discussion, reports of general Army experience available at present indicate that atabrine is the essential etiological factor (reported first by Lieut. Colonel Charles Schmitt and Major Thomas Nisbet). The mechanisms resulting in the lichenoid reaction and the eczematoid reaction are probably different. For example it was observed in a carefully controlled series of cases at Moore General Hospital (Major James Bazemore and Captain Herbert Johnson) that the time interval preceding exacerbations of eczematoid lesions is much shorter than is the case with the lichenoid lesions. The fact that the incidence has been so very much higher in New Guinea and adjacent islands and in Assam and northern Burma suggests that climatic or geographic factors may play a contributory role in the etiology. There is evidence which indicates that various forms of cutaneous trauma may contribute to the onset and localization of the lesions, particularly the eczematoid phase of the eruption. The sequence of events in many cases suggests that individuals taking suppressive atabrine have a tendency to acquire chronic eczematoid dermatitis on contact with external allergens (such as certain jungle plants and trees) rather than self-limited contact dermatitis which is the usual course of events. It appears that cutaneous reactions are more frequent in individuals who have been taking atabrine in dosages above the recommended suppressive amount. (0.7 gm. per week). It should be emphasized that the incidence of these cutaneous diseases has been relatively low, even in New Guinea, and, from the military point of view, has not been an important handicap.

Since available evidence indicates that we are dealing with one complex, it is suggested that it would be best to group these cutaneous reactions attributed to atabrine under one heading "atabrine dermatitis complex" and classify the various manifestations as follows: (1) lichenoid dermatitis; (2) lichenoid and eczematoid dermatitis; both of these included cases heretofore referred to as "atypical lichen planus"; (3) eczematoid dermatitis (includes cases heretofore referred to as "symmetrical eczematoid dermatitis"); (4) exfoliative dermatitis secondary to (1), (2), or (3).

The treatment of these conditions depends for the most part on *early recognition of the trouble and discontinuation of atabrine*. In many instances, it is difficult to decide whether or not a given case of eczematoid dermatitis is due to atabrine. It is necessary to study such cases carefully, with careful



observation after withdrawal of atabrine and possibly cautious trial readministration of the drug (do not attempt readministration of atabrine to a patient who has had exfoliative dermatitis or a severe generalized eczematoid exacerbation). It is necessary to keep in mind the general principles in regard to drug eruptions which are outlined above. When possible, such patients should be seen by a competent dermatologist, and every effort should be made to rule out other etiological factors. Parenteral administration of penicillin is indicated in patients with secondary pyogenic infection. Local treatment should be bland and non-irritating, and should consist of preparations such as 1:9,000 potassium permanganate soaks, Burow's solution soaks, 5 percent aqueous solution of tannic acid spray for oozing intertriginous sites, and application of borated cold cream if a grease is indicated. Preparations such as salicylic acid ointment, tincture of iodine, and sulfonamide ointments should *not* be used. Arsenicals and bismuth have been tried in some cases without affecting the course significantly; they should *not* be used. Superficial x-ray therapy, if indicated, should be used only under the direction of a competent dermatologist and in small doses (not more than 75 r and not to exceed a total of more than 375 r to 450 r). At least some of these patients have some degree of light sensitivity. Therefore, exposure to sunlight should be avoided and ultraviolet light therapy should *not* be used. All patients should be studied from the general medical standpoint, including studies of blood, serum proteins, and liver function. Therapeutic agents such as plasma, liver extract, multiple vitamins, and intravenous glucose should be used when indicated.

The prognosis varies from individual to individual. In general it is excellent, especially if the patient is hospitalized early in the course of the disease and the therapeutic measures outlined above are initiated promptly. The lichenoid lesions involute slowly, but they do not tend to recur; the eczematoid phase of the eruption may involute rapidly, but it tends to recur and is responsible for the prolonged disability which occurs in some cases. In general, recovery is a matter of weeks and months. Residual hyperpigmentation, depigmentation, and atrophy at the sites of lesions become less pronounced as time goes on and the hypohidrosis which occurs in many patients also improves spontaneously. The course is usually *prolonged* in all cases of exfoliative dermatitis because of frequent exacerbations. It should be noted that these patients have not been followed for a sufficient length of time to make final statements in regard to the prognosis of these cutaneous reactions.

Another major type of cutaneous reaction which has been attributed to atabrine is primary exfoliative dermatitis, not secondary to the lichenoid-eczematoid syndrome. This is characterized by acute fulminating exfoliative dermatitis, demonstrably associated with true hypersensitivity to atabrine. It is in every

respect similar to exfoliative dermatitis due to other agents such as arsenicals. This type of cutaneous reaction to atabrine is believed to be associated with atabrine much less commonly than with quinine. Hypersensitivity of this degree may constitute a *dangerous* state in either instance.

In very rare instances, aplastic anemia, other severe blood dyscrasias (such as agranulocytosis), and severe acute hepatitis have occurred in association with the lichenoid-eczematoid syndrome and with exfoliative dermatitis. Similar cases have also been observed very rarely in individuals taking atabrine who do not develop skin disease. The fatality rate in these cases of aplastic anemia and of hepatitis has been almost 100 percent. The relationship between this condition and the skin disease is not clear, but the association is striking. (As regards hepatic disease, in areas where infectious hepatitis is common, the exclusion of this infection may be extremely difficult.)

Bluish pigmentation deposits of characteristic distribution involving the hard palate, nail beds, epiglottis, and tracheal rings, and rarely other parts of the body also have been reported in patients who had been taking suppressive atabrine for long periods of time. It is not thought this bears any relation to the lichenoid-eczematoid reaction, although the two conditions sometimes occur in the same patients. Also in rare instances, cases of urticaria have been attributed to atabrine.

Information about the cutaneous reactions described above has been collected from all quarters and analyzed. Further data are constantly being gathered. Carefully planned studies designed to clarify the significance of these dermatoses and the role of atabrine and other suggested factors in their etiology are being performed both in the United States and overseas. Medical officers who have been stationed in the theaters where these reactions have occurred as well as those who have seen these patients in general hospitals in the zone of the interior have submitted articles which have now been released for publication.

The fact that psychological disturbances occasionally appear in association with the use of atabrine is well known. When unduly large doses are given, and rarely with moderate doses, for clinical treatment, toxic delirium, such as occurs with bromides, may develop. The psychological disturbance may take the simple form of brief periods of confusion. Such manifestations have been reported occasionally in connection with suppressive medication, especially when unauthorized high doses have been taken.

Many untoward effects have been attributed to atabrine which undoubtedly have no connection with the drug, as in the instance of the rumor that it affects the sexual powers.

In accordance with paragraph 7, AR 40-215, 25 April

1945, when after thorough study it is concluded that an individual is definitely sensitive to atabrine (or quinine), as in the case of other drugs, appropriate entry should be made on W.D., A.G.O. Form No. 8-117 (Immunization Register).

Quinine is available for the treatment of individuals who are known to be sensitive to atabrine or to be seriously intolerant of the drug. It should not be used, however, for units or organizations as a whole.

#### SUMMARY

In the light of these considerations and on the basis of other data which cannot be presented in a communication of this type, the following general statements regarding atabrine and reactions attributable to atabrine are submitted for the information and guidance of all concerned:

1. The military value of atabrine in suppressing *vivax* malaria and curing *falciparum* malaria far outweighs untoward effects which have been attributed with reason to the use of the drug.

2. Suppressing doses of atabrine greater than 0.7 gm. per week should not be employed routinely. This amount has been shown to provide adequate protection against clinical attacks of malaria, provided "atabrine discipline" is strictly enforced. In clinical treatment of malarial attacks with atabrine, routine dosage should not exceed 2.8 gm. in seven days.

3. Atabrine suppressive medication should be discontinued promptly and atabrine should not be given for clinical treatment when individuals develop the following conditions: atypical lichen planus, unexplained chronic eczematoid dermatoses, unexplained toxic erythematous eruptions, exfoliative dermatitis, severe leukopenia, agranulocytosis, and aplastic anemia, acute hepatitis (not including disturbances believed to be due to malaria), or toxic psychoses which can be reasonably attributed to atabrine after careful clinical study.

4. It should be remembered that drugs other than atabrine, such as the sulfonamides and arsenicals, may be harmful in individuals with the conditions mentioned above.

5. Caution should be exercised in attributing disease conditions to atabrine until careful and complete studies have been made over a period of time to establish such relationship. Because of the widespread use of atabrine, its administration inevitably coincides with many diseases with which the drug has no connection. Even if a connection is established between atabrine and a given untoward effect, its significance relative to the military value of atabrine requires evaluation. Since the use of atabrine became widespread, clinical attacks of *falciparum* malaria have been almost eliminated and deaths from malaria have been extremely rare. There is no question of the general superiority of atabrine over quinine, both for suppression and for clinical treatment.

## The Management of Hookworm Infection

Many individuals entered the Army with hookworm infections which had been acquired in civilian life. Their number has been augmented by soldiers who became infected in the service, especially in certain overseas areas. Infections acquired in the United States are due to *Necator americanus*, whereas an important fraction of those arising in some regions abroad are due to *Ancylostoma duodenale*. The latter species is commonly believed to cause more severe symptoms and is perhaps more difficult to eliminate than *Necator*. The widespread establishment of *Ancylostoma* in the United States is a dangerous possibility against which every available measure should be used.

Hookworm infections seen in soldiers in the United States are rarely the cause of symptoms or anemia. In some overseas areas, however, new infections have been associated with the symptoms commonly described in textbooks. Even in these cases, significant anemia has been unusual. A large majority of the infections acquired in service are apparently associated with a relatively small number of worms, and even when larger numbers of worms are harbored, an adequate diet apparently compensates for the loss of blood caused by the worms.

The complete elimination of hookworm infection is difficult, and under many circumstances it is impracticable. A substantial reduction in the number of worms harbored is an essential therapeutic aim which can be achieved at a reasonable cost of time and effort with available anthelmintics.

Although special points of management are often omitted in the treatment of large groups, best results are obtained if patients follow carefully a definite regimen. The evening meal on the day before treatment should be light. A saline cathartic (preferably 30 gm. of sodium sulfate; magnesium sulfate is a less desirable substitute) should be given in the evening. No alcohol, fats, or oils should be taken at that meal or until the bowels have moved freely after treatment. On the day of treatment the patient should remain in bed and take only fluids until the posttreatment cathartic has taken effect. Three hours after the medicine is taken, a second dose of the saline cathartic should be administered. If this is ineffective, a cathartic should be given again the next day.

In the absence of *Ascaris*, the use of tetrachlorethylene in doses of 3 or 4 cc. (maximum dose permissible) is recommended. If *Ascaris* is present, 1 gm. of hexylresorcinol in "crystoids" should be given as a preliminary treatment. Tetrachlorethylene is then given after an interval of three days.

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From the Medical Consultants Division, Surgeon General's Office.

No other drug has been shown to be more effective against hookworms than tetrachlorethylene. Capsules of this drug should not be used if they are dimpled or cracked, nor should the drug be used if it has been exposed to the air for more than a few minutes. Following ingestion of the capsules, tetrachlorethylene can be readily smelled in the breath and stools of the patient. Many reports have been received to the effect that this drug has generally failed in the treatment of Army patients. In no instance, however, has such a report been based on egg counts before and after treatment or on counts of worms passed. Worms are passed for three or four days, and eggs may remain in the intestine for as long as a week after treatment.

A single treatment with tetrachlorethylene (or any other available drug) probably does not completely eliminate hookworm infection in the majority of cases. It is necessary, therefore, to repeat the treatment in many cases, especially those with the heavier infections. This should be done only if eggs are readily found five or six days or more after the first treatment. An interval of one week should elapse before treatment is repeated. A variation in treatment which may be tried as possibly offering some advantage is the use of tetrachlorethylene, 3 cc., together with oil of chenopodium 1 cc. In this combination, the stated doses should not be exceeded. The use of larger doses of oil of chenopodium, or the use of thymol or carbon tetrachloride is not recommended.

In general, two anthelmintic treatments very greatly reduce the number of worms present, and, when infections are light as is the rule in Army patients, the number of worms remaining is small. Two treatments may be accepted, therefore, as all that are indicated in a single series. Iron should not be ordered in hookworm infections unless anemia is known to be present.



Pharmacy of a U. S. Army hospital in Iceland. 1942. Signal Corps photograph.

## The Treatment of Infectious Hepatitis by Diet and Rest

LIEUT. COLONEL JOHN D. HUGHES

Medical Corps, Army of the United States

To determine the value of a diet and bed rest in the management of acute primary infectious hepatitis with jaundice, a study was carried out in Italy in the winter of 1944-45. Twenty-six cases (group A) were treated by strict bed rest and a diet consisting of about the following: protein 180 to 200 gm., carbohydrate 500 to 600 gm., and fat 50 gm. per day. Nineteen cases (group B) were used as controls and were allowed full activity and free choice of food at the ambulatory patients' mess.

The criteria for the selection of patients for both groups were exactly the same. It was required that only patients with acute primary infectious hepatitis with jaundice who were unquestionably clinically icteric would be studied, to obviate any criticism of the diagnosis. No patients were included who had had a major illness or major injury within the six months prior to the onset of jaundice. In addition, all patients were excluded who had ever had an attack of hepatitis with or without jaundice, no matter how remote the date. Finally, to obviate any later criticism of the possibility of varying virulence, both groups A and B were treated in the same hospital at the same time.

### METHOD OF STUDY

At weekly intervals the following laboratory tests were performed on all patients of both groups: icterus index, blood phosphatase, cephalin-cholesterol flocculation test, and sedimentation rate. One or more bromsulfalein liver function tests were performed on each patient after icterus had disappeared. Weight records were kept accurately on each patient. The size of the liver and the degree of liver tenderness were recorded at frequent intervals, as were appetite, amount of dyspepsia, presence of headaches, and pain in the abdomen. Group A had the hepatitis diet described above and was kept at strict bed rest with only latrine privileges. Group B was allowed free choice of foods at the ambulatory patients' mess; no attempt was made to study what foods this group ate. Group B was also allowed the normal activity of patients such as the privilege of attending cinemas, of visiting the Red Cross recreation room, of playing ping-pong, etc. Before any patient of either group was sent to duty, he had to pass successfully a seven-day exercise tolerance test.

## RESULTS

The results of the study can be seen best by comparing the following objective data from both groups.

The average number of days in hospital of group A was 67.5, and of group B, 92.3. The cases treated with the hepatitis diet and bed rest (group A) spent an average of twenty-five fewer days in the hospital than did the cases treated with a regular diet and full activity (group B).

TABLE I

*Percentage of cases returned to full duty, limited service, or recommended for evacuation to the zone of the interior*

	Group A (26 cases)	Group B (19 cases)
Full duty	26 cases (100%)	16 cases (84.2%)
Limited service	0	0
Zone of interior	0	3 cases (15.8%)

TABLE II

*Speed of return of liver size to normal*

(Counting the first day of icterus as the first day of disease)

	Group A (26 cases)	Group B (19 cases)
Liver nerve palpable	6 cases (23.1%)	2 cases (10.5%)
Liver palpable	20 cases (76.9%)	17 cases (89.5%)
Enlarged liver returned to normal size	16 cases in an average of 37.7 days	11 cases in an average of 72.5 days*
Liver one fingerbreadth at discharge	4 cases	4 cases

\*Two cases of hepatomegaly in group B were not counted in calculating this figure, because they had to be put to bed and were given a hepatitis diet. This action was taken in one case because of rapidly increasing icterus index to a height of 161, severe abdominal pains, and persistent nausea and vomiting. Similar action was taken in the other case because of severe abdominal pain and persistent nausea and vomiting.

The figures in table II show a striking difference in the speed of return to normal size of hepatomegaly in the two groups. The liver returned to normal size about twice as rapidly in the cases treated with bed rest and a hepatitis diet as it did in the cases treated on an ambulatory status with a regular diet.

*Body weight.* In group A, every patient gained weight, and the average amount of weight gained per patient was 7.2 pounds. In group B,<sup>1</sup> however, the number of patients who gained weight was 10, the number who lost weight was 4, and the number whose weight did not change was 3. The average amount of weight gained per patient in group B was only 2.1 pounds.

1. Two cases referred to in footnote to table II were excluded from consideration.



TABLE III  
*Height of icterus index and speed of its return to normal*  
 (Using 10 as the upper limit of normal and counting the first day of icterus as the first day of the disease)

	Group A	Group B
Average height of icterus index	47.3	46.1
Average number of days until icterus index returned to normal	34.3	40.2

The figures in table III show that the icterus index returned to normal almost one week sooner in group A than it did in group B.

*Speed of return to normal of blood phosphatase test* (using 4.0 Bodansky units as the upper limit of normal and counting the first day of icterus as the first day of disease). In group A, the blood phosphatase of 22 cases returned to normal in an average of 42.3 days, whereas in group B the blood phosphatase of 17 cases returned to normal in an average of 44.6 days.

TABLE IV  
*Speed of return to normal of the cephalin-cholesterol flocculation test*  
 (Using plus or minus at twenty-four hours as the upper limit of normal and counting the first day of icterus as the first day of disease)

	Group A*	Group B†
Back to normal	18 cases (72%)	7 cases (41.2%)
Average days back to normal	38.4	43.1
Not back to normal	7 cases (28%)	10 cases (58.8%)

\*One case was excluded from group A because the cephalin-cholesterol flocculation test in this case was persistently 0/0 in spite of an icterus index of 56, blood phosphatase of 6.7 Bodansky units, and a liver palpable two and one-half fingerbreadths below the right costal margin.

†Two cases excluded from group B (see footnote to table II).

The figures in table V show that the cephalin-cholesterol flocculation test returned to normal in 72 percent of the cases in group A and in 41.2 percent of the cases in group B. Of equal interest is the high degree of positivity of the test in one-half of the group B cases wherein it did not return to normal prior to discharge from hospital, even though the cases had been hospitalized from seventy-three to one hundred and two days.

*Results of exercise tolerance test.* All 26 patients in group A passed the seven-day exercise tolerance test successfully. Of the 19 cases in group B, 16 passed the seven-day exercise tolerance test successfully, 2 were transferred to a general hospital for evacuation to the zone of interior without being submitted to the

test, and one, who was later transferred to a general hospital for further evacuation, failed the test.

It is realized that two variables were being studied at the same time in this investigation—viz, diet and rest. To evaluate more accurately the effect of the hepatitis diet and bed rest, one

TABLE V  
*Cases not returning to normal*

Case	Group A		Group B	
	24-hr. cephalin-cholesterol flocculation test	Day of disease	24-hr. cephalin-cholesterol flocculation test	Day of disease
1	1 +	56	1 +	79
2	1 +	56	1 +	88
3	1 +	58	1 +	77
4	1 +	48	1 +	90
5	1 +	54	1 +	81
6	2 +	61	2 +	91
7	3 +	64	3 +	75
8	—	—	3 +	73
9	—	—	3 +	102
10	—	—	3 +	102

would have to study two more groups of patients: (1) a group treated by activity and the hepatitis diet; (2) a group treated by bed rest and a regular diet. Some work has been done already along these lines, but it has not been reported yet.

#### CONCLUSIONS

1. It is definitely unwise to treat cases of acute infectious hepatitis with jaundice by permitting them to be ambulatory during the active phase of the disease and to eat whatever foods they choose.

2. A regimen of bed rest and a high protein, high carbohydrate, and low fat diet in the treatment of infectious hepatitis, as contrasted to a regimen of full activity and regular diet, results in a much greater percentage of cases returned to full duty and a marked decrease in the period of hospitalization.

3. These conclusions are firmly supported by purely objective data such as the speed of the return of liver size to normal, body weight curves, and the speed of return to normal of the icterus index, and blood phosphatase and cephalin-cholesterol tests.

4. Further studies will have to be completed to determine more exactly which of the two factors, bed rest or diet, is the more important in the treatment of infectious hepatitis.

**Tour by Surgeon General of Sweden.**—Surgeon General David Martin Lindsjo, Director General of the Medical Administration of the Royal Swedish Defense Forces, and Surgeon-Captain Karl Eric Groth, his Chief of Hospital Administration, completed a tour of United States medical installations early in October. On 29 September, Major General Norman T. Kirk, Surgeon General, U.S. Army, gave a dinner in honor of General Lindsjo which was attended by service command surgeons.

# Anesthesia for Abdominal Surgery Following Trauma

CAPTAIN IRVING GREENFIELD

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Anesthesia for abdominal surgery is probably the most difficult that the anesthetist is called on to administer, requiring not only an adequate respiratory exchange but also adequate relaxation of the abdominal muscles. The greater depth of anesthesia often needed may disturb the individual's physiologic processes to a profound degree.

Several factors make anesthesia in abdominal surgery difficult, and so important for the well-being of the patient:

1. *The site of the incision.* In operations involving the upper abdomen, the incision approaches the area in which respiratory and abdominal movements are at a maximum. To obtain the best exposure, the recti and other abdominal muscles must be relaxed almost completely. The musculature of the abdominal wall, especially the recti and the transversus abdominis muscles, are also important accessory muscles of respiration. Their tone tends to persist until the lower planes of the third stage of anesthesia are reached. This depth of anesthesia, if used for prolonged periods, is very frequently associated with circulatory depression and anoxia. In order that the surgeon may have adequate working conditions, it is essential that quiet respiratory movements and relaxation be present.

2. *Traction reflexes.* Traction and manipulation of the peritoneum, the viscera, the mesenteric and diaphragmatic attachments, and often the large blood vessels frequently produce bizarre reflexes. Vasomotor and respiratory phenomena, as apnea, marked drop in blood pressure, and alterations in the pulse rate and laryngeal spasm, are usually seen when these structures are manipulated. These complications often require anesthetic adjustment which hinders the surgeon.

3. Surgical procedures in the upper abdomen are more often associated with circulatory depression and postoperative complications.

It is essential, therefore, that the anesthetic agent and technique employed should provide a minimum of respiratory and abdominal movements, assure adequate muscular relaxation, protect from operative circulatory depression or at least anesthetic "shock," secure control of the reflexes induced by

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Lieut. Colonel Manuel E. Lichtenstein gave many helpful suggestions during the preparation of this article.

manipulation and traction, reduce postoperative pulmonary complications, and avoid the need of heroic resuscitative measures at the termination of a long procedure to keep the patient alive.

The anesthetic agents and techniques available at most forward medical installations are adequate to fulfill the anesthetic needs for almost all types of cases. All of them, however, do not fulfill the above requirements unless a combined type of anesthesia is used.

*Sodium pentothal.* This agent has been found to be inadequate for anesthesia in the acute traumatic abdomen. In cases in which it was tried, so little relaxation was produced that supplemental anesthesia was necessary. The drug is depressing when used over a long period of time, and the depression results in an increase in postoperative complications. Manipulation about the diaphragm, liver, and stomach resulted in troublesome reflexes, such as laryngeal spasm, hiccoughs, and coughing, which were most difficult to control and did not add to the "quiet abdomen."

*Spinal anesthesia.* Individuals who are in shock or who have been in shock tolerate spinal anesthesia very poorly. The dosage necessary for a three-hour abdominal operation far exceeds that which any patient can tolerate. With multiple wounds, some are often outside of the zone of the spinal block and another form of anesthesia would be required to take care of them. The severely injured soldier who has just had a long trip by ambulance is tired and apprehensive and appreciates the fact that he can be put to sleep instead of going through a harrowing three or four hours in a conscious state while in the operating room. Not infrequently the injured soldier requests he be put to sleep for the operative procedure.

*Regional field block.* In the few cases in which abdominal, mesenteric, and splanchnic field blocks were used, we were more impressed by the disadvantages than by the advantages. The technique is time consuming and exacting, and precipitous lowering of the blood pressure is not uncommon.

*Ether.* Ether by the open drop method or combined with nitrous oxide-oxygen-ether using the carbon dioxide absorption technique has been most commonly used; however, to obtain the necessary relaxation for an adequate abdominal exploration, it is often necessary to deepen the anesthesia to the bottom of the third plane. An abdomen containing about 1,500 cc. of free blood and, in addition, gastric or intestinal contents does not yield its spasm readily and relax.

Severely injured soldiers require much less anesthesia than the same individuals would need if they were not so badly injured. This fact is offset, however, by their muscular development, their youth, and their power to recuperate. This recuperative reserve must be appreciated, protected, and conserved by every available means, for it will be needed in the immediate postoperative period.



To avoid taking a patient to the bottom of the second or mid-third plane of anesthesia, which is necessary to secure relaxation, we have used a combination of bilateral intercostal nerve blocks supplemented by ether. A similar technique was described by Bartlett,<sup>1</sup> but we have modified his technique to suit our needs. The procedure is relatively simple. The intercostal nerves in the mid-axillary line lie at the inferior border of the rib between the two intercostal muscles, at which point the nerve is most accessible, and here also the lateral cutaneous branches of the nerve supplying most of the external abdominal muscles emerge.

*Equipment and material.* Two percent novocain or metycaine, a 5- or 10-cc. syringe, a  $\frac{3}{4}$ - to 1-inch, 23-gage needle, ether or an anesthetic machine equipped for nitrous oxide-oxygen-ether.



FIGURE 1. Showing the actual intercostal nerve block. Note both arms extended at right angles to the body. Patient is already asleep.

*Technique.* The patient is put to sleep with a nitrous oxide-oxygen-ether sequence using carbon dioxide absorption or with open drop ether. When he has entered the first plane of the third stage, both arms are extended outward at right angles to the body and placed on arm boards (figure 1). The mid-axillary line from the axilla

down to the iliac crest is prepared with some antiseptic solution on both sides. Two to 4 cc. of a 2 percent solution of procaine or metycaine (without adrenalin) are injected beneath the inferior margins of the fifth to the eleventh ribs in the mid-axillary line on both sides. In a thin patient, a 25-gage,  $\frac{3}{4}$ -inch needle should be used, and in a moderately well-developed individual, a 23-gage, 1-inch needle. It is important to bear in mind that multiple punctures of the pleura may lead to serious consequences, and it is therefore necessary to use fine gage needles. The rib is palpated and the needle thrust through the tissues until it strikes the rib. It is then slightly withdrawn and directed downward and forward until it slides under the inferior margin of the rib. The fine gage  $\frac{3}{4}$ - and 1-inch needles are thrust through the tissues for their entire length. The longer needles, when used, should not

1. Bartlett, R. W.: Bilateral Intercostal Nerve Block for Upper Abdominal Surgery, Surg. Gyn. Obst., 71:194-197, Oct. 1940.

extend more than one inch beneath the skin surface. In thin patients, caution is necessary lest the longer needles penetrate the pleural cavity.

By the time the injection is completed the patient is ready for the surgical preparation and incision (chart 1). The patient is then intubated to make certain of an unimpaired airway, to reduce the intra-abdominal pressure, and to provide against aspiration of foreign material should vigorous manipulation of the stomach force its contents out. We have seen this happen

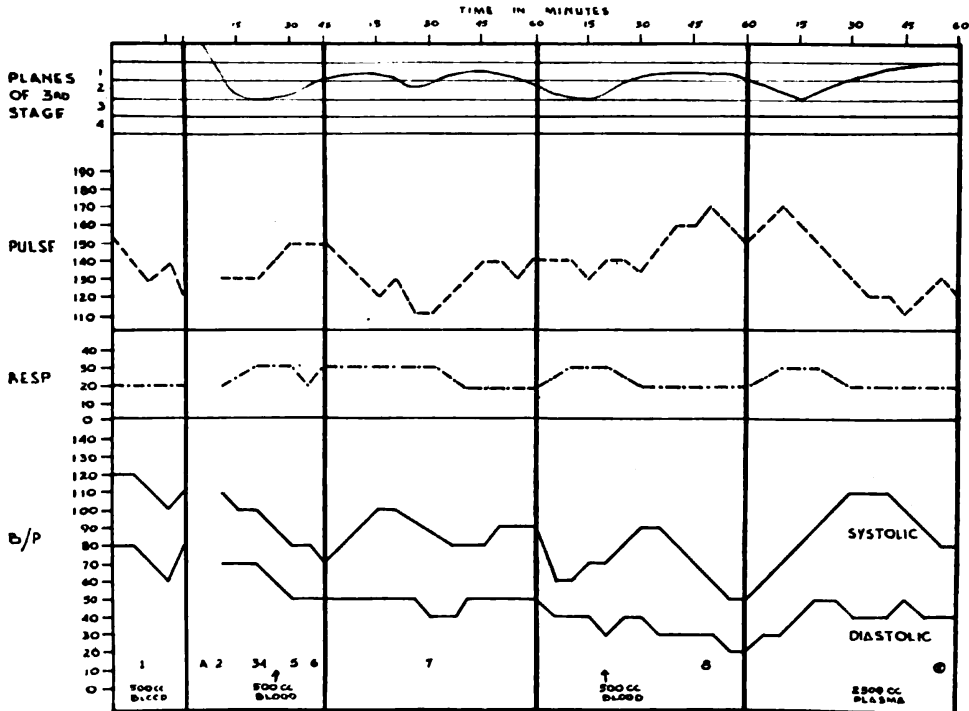


CHART 1. Italian male civilian, 37 years of age. Mine explosion. Wounds penetrating, perforating, and lacerating of face, neck, chest, abdomen, scrotum, both thighs, legs, and arm. Traumatic amputation of left forearm lower third. On admission received 500 cc. of plasma and 500 cc. of blood. Although intra-abdominal injury was apparent, it was decided that amputation of the traumatic stump of the left forearm should receive surgical priority. Fifteen hours had elapsed since injury, and signs of beginning anaerobic gas infection were present. 1, First operation at 1400 o'clock, 11 January, guillotine amputation of left forearm upper one-third. Anesthesia, brachial plexus block, 40 cc. of 2 percent procaine left supraclavicular route. Duration of anesthesia and surgery one hour and twenty minutes. A, Sent back to shock ward for further shock treatment. Received 500 cc. of additional blood in shock ward. At 2100 o'clock returned to operating room for abdominal exploratory. 2, Onset of anesthesia. Nitrous oxide, oxygen, ether with carbon dioxide absorption. 3, Severe excitement during induction. 4, Inter-costal nerve block, bilateral, five to 11 intercostal nerves 2 cc. 2 percent metycaine, oral intubation, 38Fr. 5, Start of surgery. 6, Peritoneum opened and 1,000 cc. of foul-smelling blood aspirated. 7, Repair of numerous small rents in small bowel; small bowel resected with end-to-end anastomosis; tear in ascending colon exteriorized. 8, Peritoneum closed and other wounds débrided. (x), End of anesthesia and surgery. Duration of anesthesia and surgery three and one-half hours. Uneventful postoperative course. On 17 January 1944, left eye enucleated under pentothal and local.

in spite of preoperative gastric aspiration. The entire procedure takes about two to four minutes and as one becomes more experienced less time may be required. No impairment of the intercostal activity or diminution of the tidal exchange has been noted.

Adequate relaxation is thus assured for at least two hours. The patient is controlled at a low first or top second plane of anesthesia. It is this initial two-hour period that is so important to the shocked patient. It is in this period that the explor-

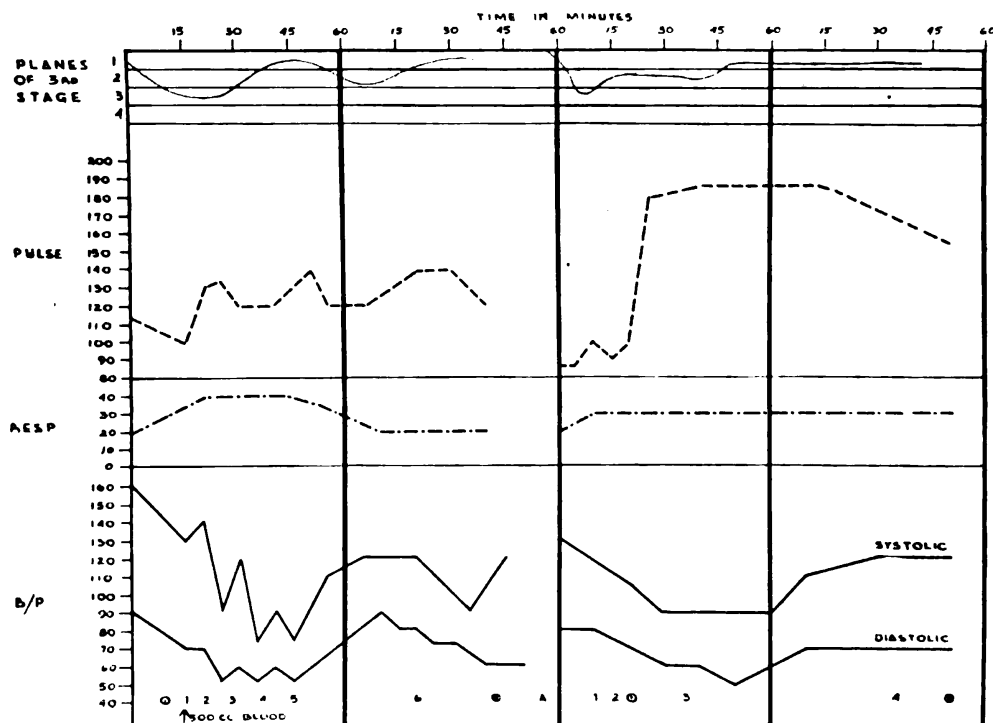


CHART 2. Shell-fragment wound penetrating abdomen; fracture compound comminuted left fibula and tibia; multiple wounds, penetrating and perforating both legs; wound penetrating skull, with evidence of injury to both frontal lobes. First operation, abdominal exploratory, 0200 o'clock, 19 March. On admission received 1,000 cc. blood. Start of anesthesia, nitrous oxide, oxygen, ether with carbon dioxide absorption. 1, Intercostal nerve block, bilateral, five to eleven intercostal nerves, 2 percent metycaine used. Unable to insert intratracheal tube. 2, Start of surgery. 3, Marked increase in respiratory rate unaffected by change of soda lime or open drop ether. (No morphine given with premedication because of head injury.) 4, Morphine sulfate,  $\frac{1}{4}$  gr. intravenously, given to decrease respiratory rate. 5, Peritoneum open, three holes in ileum and one hole in mesentery of ileum sutured; other wounds débrided. End of anesthesia and surgery. Duration of anesthesia and surgery one hour and forty-five minutes.

1, 1400 o'clock, 19 March. Craniotomy. 1, Onset of anesthesia. Nitrous oxide, oxygen, ether with carbon dioxide absorption, oral tracheal intubation. 2, Fourteen ounces of 1 percent procaine with two drops of 1:1,000 adrenalin to each ounce, infiltrated into scalp by surgeon. Note: Marked increase in pulse rate and slow steady decline in blood pressure. (.), Start of surgery. 3, Dura opened and fragment tract débrided. 4, Dura closed. (x) End of anesthesia and surgery. Duration two hours. Uneventful post-operative course in regard to abdomen; has motor aphasia.



atory part of the operation is done, hemorrhage is controlled, and the major part of the reparative surgery is undertaken. If surgery is prolonged beyond two hours, it may not be necessary to increase the depth of anesthesia until closure of the peritoneum is about to start. The anesthesia is carried down to a point where the surgeon can close with a minimum amount of trauma and effort. The majority of patients tolerate well these few moments of relatively deep anesthesia (chart 2). As soon as the peritoneum is closed, the anesthesia is immediately lightened, using a nitrous oxide-oxygen sequence in a ratio of 70 to 30 in an open system. As a general rule, most patients

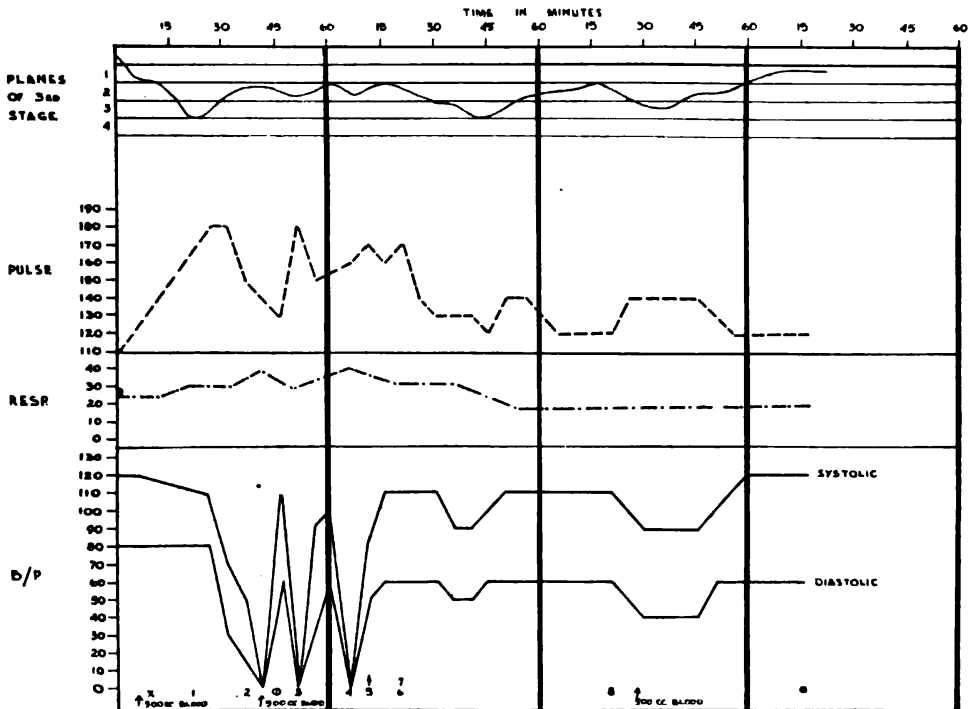


CHART 3. Shell-fragment wounds of scalp, right buttock, right thigh, fracture compound comminuted; penetrating wound of abdomen. On admission received 750 cc. plasma, 1,000 cc. of blood. *x*, Start of anesthesia nitrous oxide, oxygen, ether, with carbon dioxide absorption. 1, Nasal intubation, 38Fr. 2, Placed on abdomen. (.) Onset of surgery. 3, Deep muscles of thigh exposed from iliac crest to popliteal space—severe hemorrhage. 4, Placed on back. 5, Bilateral intercostal nerve block, five to eleven, 2 cc. of 2 percent metycaine under each intercostal nerve. 6, Abdominal incision and exposure of peritoneal cavity. Multiple perforations, ascending colon exteriorized. Right upper quadrant colostomy done. 7, Morphine sulfate,  $\frac{1}{6}$  gr. intravenously, to diminish respiratory rate. 8, Closure of peritoneum and débridement of other wounds completed. (*x*), End of anesthesia and surgery. Duration of anesthesia and surgery—three hours and twenty minutes.

The intercostal nerve block was done about one hour after the onset of anesthesia, the control of hemorrhage in the deep structures of the thigh being given priority over the abdomen. It was after the surgery on the thigh was completed, and hemorrhage controlled, that the intercostal nerve block was done prior to the abdominal incision. Patient had an uneventful postoperative course.

leave the operating room with active pharyngeal reflexes and many are awake.

Should the patient have other associated wounds which require attention prior to the exploration of the abdomen, these are done under nitrous oxide-oxygen-ether. The intercostal nerve block is done just before the abdomen is prepared for surgery. In this manner valuable local anesthesia time is not lost (chart 3). We have noticed that these patients complain less of pain in the site of their incision postoperatively, and the amount of morphine needed for their comfort is much less. It is our impression that the postoperative pulmonary complications have been reduced in number. This technique almost ideally meets the requirements enumerated earlier in this paper. Adequate muscular relaxation is provided. Respiratory and abdominal movements are at a minimum. Operative circulatory depression or, at least, anesthetic "shock," is guarded against, and postoperative pulmonary complications have been reduced.

In a period of ten months, about 6,000 casualties injured in battle or by accident were admitted in a forward evacuation hospital. Of these, 101 had evidence of intra-abdominal injury. With few exceptions, these represented the most serious casualties and as such received high surgical priority. All of these had other associated wounds. Analysis of the 101 cases shows that the following anesthetic techniques and agents were used:

Method	No. of cases	Complications*	Deaths
Ether, open drop	13	1 bronchopneumonia	6†
Nitrous oxide-O <sub>2</sub> -ether	16	1 bronchopneumonia	2
Bilateral intercostal nerve block, N <sub>2</sub> O-O <sub>2</sub> -ether	47	1 bronchopneumonia	5
Bilateral intercostal nerve block, ether open drop	10	1 bronchopneumonia 1 atelectasis	2
Pentothal, N <sub>2</sub> O-O <sub>2</sub> -ether‡	3	0	0
Pentothal, N <sub>2</sub> O-O <sub>2</sub> -ether-chloroform§	1	0	0
Local infiltration plus ether, open drop	4	1 bronchopneumonia	0
Spinal pentothal	3	1 bronchopneumonia	1
Splanchnic and mesenteric block	4	0	0
Total	101	7	16

\*All patients in this group recovered.

†The high incidence of postoperative deaths was due to working with inadequate equipment, personnel, and facilities in the early days of an initial beachhead operation. Several of these patients were in persistent shock with no response to resuscitative therapy.

‡Inadequate relaxation with pentothal requiring supplementation by nitrous oxide-oxygen-ether and intubation.

§Adequate relaxation never obtained even with local infiltration of the fascial and peritoneal sheaths.

#### SUMMARY

The method of anesthesia described is of distinct benefit when dealing with severe, acute, intra-abdominal injuries. It is a combined type of anesthesia using nitrous oxide-oxygen-either, intercostal nerve block, bilaterally and intubation. It does not require special drugs or cumbersome equipment. All necessary materials are available at any forward surgical field hospital or evacuation hospital. It is not time consuming, offers the surgeon almost ideal operating conditions, protects the patient from the consequences of prolonged deep anesthesia, reduces pulmonary complications, and gives a more comfortable postoperative patient.

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## The Successful Neurotic Soldier

MAJOR WILLIAM NEEDLES

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The efficient and economic operation of the armed forces has been seriously hampered in World War II, as in World War I, by inducting into the services individuals who subsequently became neuropsychiatric casualties. From the extreme case of the soldier who, after a year or more of preparation for combat, breaks down after only a few days on the battlefield, to the man who succumbs early in his military career, they are all liabilities. Time, energy, skill, and materials are devoted to their training without commensurate returns. Despite measures in force to eliminate potential misfits, far too many find their way into the services. There is need for improved methods of screening. To some it may be trying to acknowledge that psychiatry can offer only tentative solutions for this pressing problem. To those not too well disposed toward psychiatry, the failure to evolve a satisfactory program in an emergency will appear as evidence of inadequacy of the specialty and its followers. But the difficulties are inherent, rather, in the nature of the task. The physician can with great alacrity pass or reject men on the basis of height, weight, vision, or blood pressure; however, if he were asked to select men with a lesser susceptibility to pneumonia when exposed on the battlefield, he would be nonplused. The psychiatrist deals with equally elusive factors which defy facile evaluation, and his progress must accordingly be faltering.

Opinion is divided on whether or not an adequate screening system can be devised, whether one can narrow the meshes through which the unfit slip without excluding a good deal of worth-while material. Some maintain that human behavior is based on so many incalculable elements as to render unpredictable a man's performance in the Army. In their view,

actual life in the Army and the ordeal of battle must remain the testing ground. With this view, the wastage that results from neuropsychiatric casualties must be accepted as unavoidable, just as a bullet wound which renders a soldier *hors de combat* after only a few days in battle. Others hold a more sanguine opinion on the possibility of predicting a man's fitness for combat, and they have drawn up criteria that can be applied quickly on a large scale. During a global war, the temper of the times will naturally favor any such positive attitude which seems to promise so much. In a war of this type, huge masses of men and material must be prepared and transported into vital places in a minimum of time. Victory hinges on the development and application of streamlined mass-production methods. What seemed impossible one day, becomes achieved the next, and new, ever higher goals are set, to be, in turn, realized and surpassed. The desire of the psychiatrist to share in this large-scale preparation by perfecting a rapid selection method is understandable. However, it has happened before that zeal and a sense of urgency lessen the critical appraisal of a situation. Hence, evidence in favor of greater conservatism and caution in the application of screening methods may not be amiss.

In a previous study<sup>1</sup> one hundred neuropsychiatric combat casualties and one hundred control cases were surveyed to determine whether any definite characteristics distinguish the two groups. Of numerous criteria investigated by means of a questionnaire, two seemed significant: (1) the incidence of

TABLE I

Time in combat	Number of cases	Incidence of NP treatment prior to combat	Incidence of 8 or more neurotic traits (of a possible 14)
1-15 days	46	33%	35%
16-30 days	35	28%	29%
31-60 days	56	25%	32%
61-90 days	35	37%	31%
Over 90 days	28	28%	25%

previous treatment for some nervous condition either in civilian life or in the Army prior to combat and (2) the presence of eight or more neurotic traits out of a possible fourteen. On the basis of these criteria, fifty-two of the one hundred neuropsychiatric casualties would have been screened out before entering combat while, in the control group, only twelve would have been eliminated. This disparity appeared to war-

rant further consideration. However, the danger of arriving at faulty conclusions on the basis of a small sampling of cases was borne in mind, and any conclusion from the study was

1. Needles, William: Statistical Study of One Hundred Neuropsychiatric Casualties from the Normandy Campaign, submitted for publication to the American Journal of Psychiatry.

regarded as tentative until applied to and checked by much larger numbers.

This conservative attitude has been justified by subsequent developments. As a check on the first study, the two criteria that seemed significant were applied in a further analysis of two hundred soldiers from the campaigns in France and Germany. These had all been returned as neuropsychiatric casualties after various periods of exposure to combat. The object was to compare the incidence of treatment for a nervous condition prior to combat and the presence of a large number of neurotic traits in those who broke down in a very short time and those who managed to carry on for a substantial period. In studying the results of this survey, it must be pointed out that the tempo of operations in these campaigns was such that a survival period of sixty or more days was unusual; hence, soldiers in that group could safely be considered hardy and successful fighters. The results of the analysis are indicated in table I which reveals the fact—surprising and disconcerting from the standpoint of the first study—that there is no essential difference between the early breakdowns and the soldiers with a relatively long survival period.

At this point it seemed that a study of individual cases might prove informative. If, as the foregoing analysis indicates, there are soldiers with an imposing psychoneurotic predisposition who manage to stand up well in battle, clues might be obtained to account for their successful performance. For this purpose there was selected a group of individuals who fulfilled these requirements: (1) their history indicated such a degree of emotional instability and tendency toward neuroticism that any experienced psychiatrist would hesitate to induct them into the services; (2) they had stood up well in combat for at least sixty days before they were hospitalized on neuropsychiatric grounds. Each subject was personally interviewed and the history reviewed and obscure points cleared up or additional information obtained. The purpose of the study was then explained and the soldier requested to describe, as definitely as he could, the elements he relied on to sustain him in combat, the motives, forces, impulses, or convictions which, in his opinion, helped him, literally, to stick to his guns. Since the history in these cases indicated a strong predisposition to anxiety, it could be assumed that powerful incentives were required to neutralize such anxiety and to render the individual effective as a soldier. The subjects varied in their ability to gage themselves psychologically and to formulate their ideas, but on the whole the material obtained proved illuminating.

CASE 1. A corporal in a tank destroyer outfit, aged 24, with 2½ years of service, had been in action about 300 days in the African, Italian, and French campaigns. He was hospitalized on 15 November 1944, when he became uncontrollably nervous and developed headaches, dizziness, precordial distress, and palpitations. He was suffering from a severe anxiety

neurosis. His childhood was marred by a strict, domineering father, who frequently came home drunk and abused and assaulted the rest of the family. The patient was constantly in fear of his father as, in later life, he was of his bosses and superiors. He was deeply attached to his mother, who apparently overindulged him. He was enuretic until 6 years of age. He recalls having been nervous and easily upset from his earliest years. Anticipation of rather ordinary events would make his heart pound and his pulse race. He had to relinquish one job because the tediousness set him on edge. He was shy and timid with girls and had to have a drink or two before having the courage to ask for a dance. He was afraid to ride in automobiles. Six months prior to induction he had been treated for "allergic colitis." He had always been an extremely conscientious person, meticulous in his working habits and worried about details. When asked what enabled him to stay in combat as long as he had, he volunteered the following: (1) He was aware of shortcomings in his make-up when he entered the Army. During his Army career he read articles in popular journals about "psychoneurosis." Stimulated by these he decided to do something for himself as he "didn't want to be a psychoneurotic." In his endeavor to be a normal person he forced himself for example to counter a seclusive tendency by purposefully exposing himself to social contacts. He recognized the need for greater self-reliance and took appropriate steps to attain this goal. Whereas he had been sensitive to "ribbing" by other soldiers and reacted unduly, he now assumed a nonchalant pose. These compensatory measures were carried along into combat. He was determined, as he put it, not to let his emotions dictate to his head. When he was tempted to turn back, he would chide himself, "Go ahead, fool; run to mama." His strong resolve to carry on as a healthy individual rather than to expose his weakness spurred him on. "If my buddies could carry on, I'd show them I could, too," he explained. Other factors which played a role in sustaining him were: (2) His faith as a Catholic; he believed that God would take care of him and spent a good deal of time during combat praying. (3) Affecting letters from his sisters, as a result of which he determined to expend himself to the utmost on their behalf. (4) Stationed in a tank destroyer, he felt some security because of the armor plating of the vehicle. (It is characteristic of the make-up of this patient that he sought out the examiner a few days after the initial interview to add this last detail. He explained that it had since occurred to him and that he could not rest or sleep until he had told him.)

In this case what would popularly be called exercise of will power and its triumph over acknowledged weaknesses is apparent. To the psychiatrist there is evident what has elsewhere been characterized as the need to simulate health. The patient had his attention fixed on a standard of normal behavior derived from his excursions into psychiatric literature. The factors enumerated sufficed to keep a fundamentally timorous, dependent, anxiety-laden individual in combat for 300 days before the compensatory mechanisms broke down.

CASE 2. A private, 23 years old, with 2-3/12 years of service, had been in combat as runner in a rifle company for two months before hospitalization. He finally became careless and preoccupied with certain forms of obsessional thinking so that he could no longer carry on. In earlier life he had been addicted to some of the common superstitions attached to black cats, walking under a ladder, and the number 3, and he had shown certain compulsive traits as checking the lights, doors, and gas jets more than once before being satisfied they were in order. He had always tended

to be an extremely conscientious person. A rather trifling event 3½ years ago precipitated a marked alteration in his behavior. He had taken a streetcar but, not recognizing certain landmarks on looking out the windows, thought he was going in the wrong direction and got off, to find that he had been on the right car after all. Since then he had been harassed by persistent doubts about the correctness of everything he did or thought. Even cleaning his teeth or washing his face would be interrupted and prolonged because of these doubts. In the debates that went on within him, one part of his mind would accuse him of being weak and ineffectual; the other would insist that he knew what he was doing and how to do it. Added to this distracting mental state, which caused him no end of anguish, were other symptoms such as loss of weight, excess perspiration, anorexia, insomnia, lassitude, and tremulousness at the slightest excitement. Despite this maddening anxiety, the patient had carried on effectively in combat for two months. When asked for the explanation, he replied that he was so miserable from the incessant obsessional thinking that went on within him that he ceased to care what happened to him. Even death would have been a relative comfort. He had on several occasions prior to combat thought of shooting himself. He claimed to be unaware of fear during combat although shells were flying about him. Only toward the end did his doubts and hesitations incapacitate him.

It is fairly safe to assume that few psychiatrists would have given a very optimistic forecast of this soldier's performance in combat. The case makes clear how an impulse toward self-destruction, in itself unhealthy and disruptive, can lead to vigorous, aggressive, and competent behavior on the battlefield. It points to the curious interplay of psychic forces, which leads to no end of surprises in human behavior.

CASE 3. A private first class, aged 34, with 1 year of service, had been in action 3 months as a rifleman before hospitalization. He had seen plenty of action and gone through the usual gamut of gruesome experiences before he finally succumbed. He was brought up in a hectic household, which his father, an alcoholic, terrorized. Among other devices the father used to terrify the mother was to punish the children to the point of torture. The patient was tied to the leg of a stove once for this purpose; however, he was never aware of any feelings of hatred toward the father, just as, in subsequent life, he was never really angry at anyone. He had always been extremely sensitive, shy, and seclusive. He was upset by the slightest dissension. He was docile and obedient as a child, and in later life he was never assertive. In a group he had had to resort to rehearsing to himself what he was about to say; otherwise, he would "fumble" in the midst of it. He was worrisome. Nail biting existed to a severe degree in childhood. He had pronounced fears of being kidnapped. He was very deliberate and postponed making decisions as long as he could. Sexually he had been naive. After his second experience he developed both gonorrhea and syphilis. Thereafter he was afraid of contaminating others, avoided touching things, and washed his hands frequently. He had avoided intercourse ever since and foresworn marriage. A college graduate and teacher of English, his chief interests were music and dramatic arts. In the hospital he was tearful, depressed, anxious. He gave the impression of an unusually passive, dependent, benign, childlike person in a state of pathetic helplessness. When asked how he managed to carry on in combat for three months until dyspnea, syncopal attacks, and "jitteriness," got the better of him, his answer was, "I forced myself to carry on. All my life I obeyed. I couldn't bring myself to disobey. I was put



there; there was nothing I could do about it. I would never think of disobeying. What I'm told to do, I do. I always feel that they know better than I do—the men in charge."

One was impressed, in this case, by the pattern of submission, awesome respect, fear, and unquestioning obedience which existed in childhood and was carried over onto the battlefield. Officers were surrogates of the irascible father, whom it would be anathema to challenge. While one usually conceives of the emotionally immature soldier, who has not cast off his early dependencies, as a poor prospect, in this instance, the alternative to implicit obedience, the wrath of the father-figure, evokes such dreadful anticipations that it keeps the subject glued to his post. This soldier's strength to go on, if it may be called that, derives from inability to do anything but obey others—a negative sort of motivation as compared with that of the soldier whose source of strength is located more centrally, within himself.

CASE 4. A private, aged 28, in the Army 1 year, served in the infantry for two months before hospitalized for anxiety neurosis. His mother had doctored for nervousness and stomach ailments for many years. He had been nervous as long as he could recall. He was a nail biter in childhood, had nightmares, and on one occasion somnambulism. He felt shaky when exposed to quarrels. He was uneasy in high places and had a fear of dogs. After graduating from college at 22 years of age he began to work in a mill, and two years later when advanced to a responsible post, he became apprehensive lest he should not prove capable. He developed gastric symptoms and headaches and was forced a year later to give up the job. His gastric symptoms persisted to some degree throughout his Army career.

When asked how he managed to carry on for two months in the combat zone, he explained: "I was afraid of what somebody would say if I quit. In school other fellows would call me a quitter if I didn't finish a job. I couldn't get out of it diplomatically, so I would keep on. I'm too self-conscious of what the group would say. Dad used to say, 'You start something and you never finish it. I want you to stick.' Then I'd follow through to the end whether it turned out satisfactory or not." The patient added, somewhat sheepishly, that he had at one time contemplated shooting himself through the foot while he was on the battlefield but had reflected, "There are old timers here; they would know." The patient had originally tended to be rather impetuous and impatient. If he were engaged on a certain project and it did not progress to his satisfaction, he would drop the whole business or smash up the materials involved. His father, a fairly strict taskmaster although not given to corporal punishment, took the patient in tow, gave him household chores to perform and made him toe the mark. If a job was not carried out satisfactorily, the patient had to repeat it. There was no praise for good work but plenty of censure if he failed. The patient felt oppressed, too closely observed by his father, but this type of supervision apparently succeeded in substituting a more methodical, painstaking behavior. The patient explained, "I am very much aware of what he will think." During combat he had explicitly felt, "Dad wants me to do what I can."

In this case, pre-established modes of behavior were apparently decisive in determining performance on the battlefield. The critical father whose standards had been taken over and assimilated by the soldier continued to wield his in-

fluence. To be a quitter now was to violate principles built up at great cost over many years. A painfully acquired and cultivated sense of conscientiousness prevailed over forces which unopposed would have prompted the soldier to give up much sooner.

CASE 5. A corporal, aged 25, with 4 years of service, was in combat for 90 days as an assistant gunner and radio man in a tank. During the last week of action seven-eighths of the tanks of his regiment had been destroyed. He had had six tanks shot out from under him. The first time he had been rendered unconscious and had to rest in a clearing company for three days. It was following the last episode, in which he was again rendered unconscious, that the patient developed a tetraplegia and was hospitalized for anxiety hysteria. As a child the patient was subject to fear of darkness, thunderstorms, and high places. Enuresis had persisted until 4 years of age. Temper tantrums were frequent. In school he had been nervous when called on to recite. To explain his remarkable staying power in combat, he immediately answered that his older brother, a member of the same company, had been killed in the same engagement in which he himself had been knocked out, two weeks after entering combat. He had been grief-stricken, tense, and irritable for the remainder of his combat days. But he was so mad and so driven by the desire for revenge that he no longer heeded danger. He felt an intense urge to drive forward relentlessly into combat. Reflectively he commented that he must not have been in his right mind during this period. He was convinced that if he had not been animated by this all-consuming impulse to even the score, he would never have stood up in combat as long as he did.

From this case and from numerous others it is clear that the presence in the same unit of some individual who represents a great deal to the soldier can be of decisive importance. At times it is a relative, at times a boyhood friend from his home town, at times a buddy in the Army to whom the patient is deeply attached. The death or maiming of such figures transposes the war from the impersonal plane to one where the issue become a deeply personal one. Extreme reactions of hate and desire for revenge are unleashed until ordinary considerations of caution and self-preservation no longer operate. At times the injury or loss of the individual to whom the soldier is so closely attached may exert a contrary influence. Instead of being inspired to feats of bravery the soldier acts as if his world has suddenly collapsed beneath him. The support on which he depended is withdrawn and he becomes helpless. While the protective figure is still about, however, this type of soldier derives sufficient comfort and sustenance to enable him to defy his own wavering enthusiasm for combat. He evades neurosis just as in civilian life some individuals do, so long as a sufficiently shielded environment is afforded them. Such seems to have been the situation in the next case.

CASE 6. A private first class, aged 31, with 4-2/12 years of service, while serving as a radio technician in Iceland developed insomnia, tension, inability to concentrate, and tremors which interfered with his work. He entered combat in Normandy in July 1944. After two months his symptoms reappeared but he stayed on two months more. His explanation for the ability to do so was that he had two or three close friends in the same

unit. When he became upset, "They helped me; they looked after me." Without them to depend on he was convinced he could not possibly have held out.

In some cases alcohol is a potent factor that helps the wavering soldier make the grade. Before what may be called the amytal era of military psychiatry, self-cure was sought and effected by the soldier in this way. Psychiatrists are familiar from civilian experience with the resort to alcohol as a means of escape from intolerable, anxiety-producing situations. It is understandable that it should provide comfort in battle, especially to the individual previously accustomed to its use for that purpose.

CASE 7. A sergeant, aged 37, with 2-5/12 years of service, was in action as a tank commander for two months before hospitalized for anxiety neurosis. He had always been of a nervous disposition. Nail biting, somnambulism, and nightmares occurred in childhood. He was upset at the sight of a drop of blood. He was uncomfortable in class in school, jittery when called on to recite, and would have preferred to run away. He was afraid to be out at night because of the darkness. He was shy and uncomfortable in a group. Since the age of 18 he had been drinking excessively to quiet his nerves and his excesses were held responsible for a "nervous breakdown" he had at the age of 31. For four months he could not work, suffered from insomnia and shakiness, and wanted to be alone all the time. There was no history of delirium tremens or acute hallucinosis. He had been apprehensive when he entered combat. "Everything was jumping inside me." When asked what had kept him going for two months, he replied: "I wanted to stay in there till the job was done that I was told to do. I wanted to do my bit \* \* \* I'd get cognac from the people in the towns we passed through and that kept me going. If I didn't have it, I was so weak, nervous, and tired that I couldn't do anything. We had a lot of it on hand, had it most of the time I was in action. It would brace me up, put me in good spirits, and I could go on. It stopped the shakes inside me; when I had the drinks in me I didn't mind the shells so much; with no drinks I couldn't stand it."

Ten additional cases fell within the scope of this study. In them themes similar to those outlined were uncovered. In one instance a soldier who derived his main comfort from faith in a protecting power was confirmed in this faith by a curious coincidence. Because he had fallen into a creek and wet his socks, he was unable to go with his platoon on a sapping expedition. A shell fell in the midst of his comrades when thus engaged and wiped them all out. It was apparent how this adventitious circumstance had increased his conviction of inviolability and helped him to carry on. In some cases affiliation with an army that was continuously sweeping forward and whose morale therefore was high seemed a potent factor. In others a strong sense of duty, responsibility to the group, played an important role. It is not the object of this study to treat exhaustively all factors operative in these cases; hence, it is not necessary to cite examples indefinitely. The purpose will be served if sufficient material has been presented to give a general idea of the *modus operandi* of numerous, varied, and unpredictable forces that keep the unstable soldier in action.

### DISCUSSION

It may be objected that the method of eliciting information in this study and the interpretation of the material betray a naive psychologic outlook; that too much importance is attached to the few comments that each soldier gave in explaining his performance in battle, that direct questioning brings to light only factors of which the soldier is consciously aware and neglects powerful unconscious determinants. However, the general tenor of this paper should indicate that human conduct is looked on as the resultant of innumerable forces and modifying influences. If a few responses in each case were singled out, it was not because they were thought to provide the whole answer, but merely a significant part of it. There is no underestimation of the enormous influence of unconscious forces. Sadistic and masochistic drives, identifications of one sort or another, projection mechanisms, displacement of affect, etc., are rampant in every soldier as they are in every civilian. But this does not militate against the fact that conscious motivation and striving, in the type of conflict to which the soldier is exposed in battle, can exert a decisive influence on the outcome.

The main object of the paper is to suggest that because of the innumerable factors which determine human behavior, and the subtle interplay of these factors, it is difficult to devise a rigid, abbreviated screening process to separate the wheat from the chaff. The search for some magic formula, a method whereby men can be categorized with the speed of a punch card system, is understandable. But the need for such must not be confused with the possession of such nor lead to hasty yielding to the pressure of the times.

Every soldier may be considered as having a complicated psychic system with definite debits and credits from the standpoint of military achievement. Thus, sense of duty is pitted against the wish to keep from being hurt, membership in a prestige-laden outfit, such as the Air Forces, counterbalances morale-lowering resentments, ideologic convictions act as a buffer against disheartening domestic difficulties, pride or self-esteem neutralizes the effect produced by the arrival of replacements, a grim reminder of the fate of those they are to replace. This enumeration might go on indefinitely; so if it were merely a matter of an inventory of assets and liabilities along these lines, the task of assessing the soldier would be difficult. But the problem is rendered more complicated by the fact that the same factors, occurring in different constellations from one individual to the next, exert a totally different influence. The same degree of anxiety may in one individual be much more devastating than in another, just as a given weight on a lever exercises a variable force dependent on its distance from the fulcrum. Some individuals may have a good measure of anxiety in their make-up, yet build up strong de-

fences against it until they acquire a certain immunity. When it is further realized that overt tendencies may cover up diametrically opposite, deep-seated urges, which though discernible only by the use of prolonged specialized techniques nevertheless exert their pressure all the time, the problem of assessing a man quickly assumes greater proportions. It is because of so many imponderables in the delicate system of checks and balances in the psychic apparatus that predictability becomes so uncertain. By setting up an inelastic screening method, many suitable candidates may come to grief. On the other hand, if it is accepted that many a vulnerable personality has powerful compensating mechanisms which enable him to keep going quite a while before psychic decompensation sets in, greater caution will be exercised before discarding such individuals.

This study does not offer a final opinion on the validity of any particular screening system. Perhaps ultimately a questionnaire can be evolved sufficiently comprehensive to encompass all necessary data. Some psychiatrists with a gift for sizing up individuals quickly and with sufficient familiarity with the needs of the military may have already proved adequate for the task. At present, there is too scanty a follow-up of the products of the various screening methods involved to afford an answer. This study merely draws attention to certain findings in a representative group of cases, points out the complex interplay of forces in the determination of a soldier's level of performance, and thus suggests that any screening method which minimizes or ignores these factors remains to that extent defective.



A cub plane takes off with a Marine casualty on board from an improvised air base near the Okinawa front lines. These small planes shuttled the wounded to rear aid stations. Marine Corps photograph.

## Work Furloughs for Patients with Peripheral Nerve Injuries

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and

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A work furlough is a convalescent furlough of ninety days arranged so the patient will gain the greatest benefit from exercising and using his injured extremity. A work furlough creates a number of advantages for the patient. It should be considered a privilege to be granted only to those patients who, through their cooperation in the mobilization of their joints and in exercising their extremities in the gymnasium and in the physiotherapy department, have been proved worthy and reliable individuals.

### WHO IS ELIGIBLE

A patient with a peripheral nerve injury is eligible for a work furlough if he (1) does not need further active or passive physiotherapy for limbering up "frozen joints" or muscles, (2) is able to use in good measure some part of his injured extremity following spontaneous recovery or operation, (3) has had a nerve suture, the period of regeneration for the nerve being six to eighteen months, and (4) is able to walk with a brace a reasonable distance without injury to anesthetic areas. The same considerations for a work furlough also hold true in the case of nerve injuries which do not require surgery or will not be ready for it within the ensuing three months.

Psychoneurotics, neurasthenics, alcoholics, and emotionally unstable persons have been found to be unsuitable for a work furlough. Their work record is irregular, they are "sick" a great part of their furlough, and are a constant source of dissatisfaction and irritation to their employer and working unit. Great care should be taken in judging the patient's mental make-up and attitude toward his prospective job before granting a work furlough.

### PREPARATION

Thorough preparation of the work furlough—the most important premise for success—requires about five hours. Most of the patients wish to return to their previous plants and, injuries permitting, their previous occupations. They are referred to the U. S. Employment Office within the hospital, which keeps

a list of open positions in critical industries in the New England states and the New York area. For both groups, a form (Physical Capacity Appraisal) is checked, indicating for which activities the patient is fully or partially incapacitated by his injury.

The patient takes this form to the representative of the U. S. Employment Service in the hospital, who writes a personal letter of introduction and recommendation for the patient to the prospective employer, explaining that the bearer is (1) an applicant for a position, (2) will be authorized to accept gainful occupation in a plant handling war contracts for Army, Navy, or Air Forces, and (3) will be released from the hospital for ninety days and possibly longer when fitting work can be found for him.

The employer who is able to comply with the conditions under (2) above and who wishes to avail himself of the applicant is requested to provide the soldier with a letter stating (1) that he is willing and able<sup>1</sup> to employ him while still in the Army and is bound to allow his return after ninety days for re-examination and (2) the nature of the specific job he is offering the soldier, which would enable him to exercise his injured extremity. When letter and offer appear satisfactory, a final physical examination is carried out with particular reference to motor and sensory findings. These are added to the patient's chart. The final summary is written, including course in the hospital until that time. The chart should be kept in a casualty detachment to be created for this purpose within the hospital. The patient is sent, with his signed application for ninety days' work furlough and the letter of the employer, to the classification and separation officer, who provides him with: (1) an official letter to the employer authorizing him to employ the patient, to give him the necessary assistance, and to report to the hospital if and when patient discontinues his work before termination of the ninety days; (2) a copy of this letter and Introduction Card (Form USES-508) to the employer, addressed to the hospital, to be returned when the patient has begun his employment; (3) a card from the employment office (Form USES-537), authorizing the patient to accept gainful occupation although still in Army pay (most unions grant these patients temporary honorary membership); (4) a mimeographed form enumerating the patient's rights and duties during his work furlough; (5) a full set of serviceable uniforms including fatigue (work) clothes; and (6) furlough papers issued by the detachment of patients.

#### RETURN FROM WORK FURLOUGH

Patients are urged to sign in at the hospital, if possible in the morning hours, as ambulant patients. All efforts should be made to check the patient's condition thoroughly and evaluate

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1. Army and Navy institutions are not permitted to employ anyone still paid by Army forces in civilian occupation. The same is true of Federal Civil Service positions.



his status the same day, and to return him to his job the same afternoon if maximum hospitalization benefits have not yet been attained.

If the patient is considered ready for a Certificate of Disability for Discharge or return to duty, he is admitted to the hospital, the final summary and Clinical Record (W.D., M.D. Form 55A) completed, a final progress note made, and the chart sent to the C.D.D. Board without delay. It should be attempted to return the patient to his job within one week.

#### ADVANTAGES

Recovery from peripheral nerve injuries, spontaneous or following operative treatment, is a slow process. There is no rationale in having these patients sitting about a hospital occupying needed beds and becoming "barrack happy" during the six to eighteen months until they have attained the maximum hospital benefits required in W.D. Circular No. 423, dated 7 October 1944, supplemented by W.D. Circular No. 64, dated 28 February 1945.

There is *no substitute for a well-paid job as an incentive for exercising an injured extremity*. Optimal reconditioning, including physiotherapy and occupational therapy, cannot provide more than three to four hours' daily practice. The vast majority of patients cannot be given more than twenty minutes of physiotherapy three times a week, and one hour each day of occupational therapy and gymnasium, because of lack of personnel and facilities. The same patient is more than willing to work and to exercise his arm or leg ten hours a day if paid eight hours straight and time and one-half for two hours' overtime daily. Experience has shown that patients recover the power of their muscles and mobilize their joints more during six weeks of work furlough than in six months of reconditioning. The patient's morale is greatly improved by living with his family making money and making friends in his plant, at least for a certain time. In addition, he is enabled to adjust himself gradually to civilian life and to lay the foundation for a peacetime position. The employer, on the other hand, is usually glad to obtain a skilled worker not counted in the plant's War Manpower Commission ceiling and who can be presented as a good example to the rest of the crew who stayed at home and are grumbling about their hard lot. The manpower situation is eased in essential industries. A considerable number of jobs, highly paid at present, cannot be filled by civilians because they will not continue after the war; and such a job does not jeopardize the G.I. rights of a soldiers to return to his preinduction job after the duration.

The majority of patients with peripheral nerve injuries can be and have been sent on work furlough within one to three months after admission to Cushing General Hospital. The transformation of inpatients into outpatients permits the systematic

collection of valuable medical data concerning the restitution of the various peripheral nerves following bruise, concussion, neurolysis, and suture. It gives a reliable basis for any later statistical work-up.

Work furlough could be used to improve the critical bed situation. To give an example: The neurological-neurosurgical sections of Cushing General Hospital alone had, on 1 July 1945, 274 patients on work furlough. This means, in terms of beds available for new patients, more than 27,000 hospital days every six months with a saving of almost \$165,000 every six months in costs of hospitalization. It is expected that the number of patients to be sent on work furlough during the coming year will be a multiple of the present number. If this policy were followed by the nineteen neurological-neurosurgical centers in the United States, even on the limited basis calculated above, it would save 520,000 hospital days, or about \$3,100,000 every six months.

#### WORK FURLOUGH—INFORMATION FOR THE WARD OFFICERS

1. Decision is made by the medical officer, with concurrence of the section chief, that a work furlough is in order.

2. Physical Capacities Appraisal form is filled out by the medical officer and given to the patient to take to the separation classification officer, who in turn routes him to the U. S. Employment Office.

3. The U. S. Employment Service representative writes a letter of introduction directed to the local office of the U. S. E. S. and the prospective employer, which the patient takes with him.

4. The patient is given a pass (usually for three days) to make contact with the U. S. Employment Office nearest his home and with his prospective employer.

5. If the employer wants to employ the man, he writes a letter to the hospital (a) stating that fact; (b) outlining the nature of the work to be done; and (c) certifying that the industry is essential to the war effort or to agriculture.

6. The patient returns with letter from employer to the separation classification officer for verification and is provided with the following:

a. Official letter to employer authorizing him to employ patient. Copies are furnished the patient and the ward officer.

b. The Introduction Card, which the employer returns to the hospital when the patient begins employment.

c. A statement of the patient's rights and duties during the work furlough.

d. Authorization to obtain a full set of serviceable uniforms including fatigues.

7. The Clinical Record is completed in the meantime; final summary is written up covering course in hospital to date. The Clinical Record is then sent to the chief of section for approval and retention.

8. The ninety-day furlough application is signed and brought by the patient to the separation classification officer for clearance and for forwarding to the detachment of patients.

9. If on return to the hospital, it is felt that maximum benefits have been obtained, the decision is made either to return the patient to duty or to discharge. If maximum benefits have not been obtained, he is checked up on an outpatient basis and returned—if possible, the same day—for another ninety-day work furlough.

# The Lichen Planus - Eczematoid Dermatitis Complex of the Southwest Pacific

A Study of 65 Cases

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The dermatoses contracted overseas are assuming a major aspect in the disabilities suffered by the armed forces. Those serving at an installation which receives evacuees from all battle fronts have developed a healthy respect for the cutaneous-injuring factors in the Southwest Pacific, particularly New Guinea and adjacent islands. These dermatoses are severe and incapacitating. A fatal outcome may terminate the more severe examples. The prognosis in regard to recurrences is unknown but guarded. The clinical picture apparently has not been described in any textbook of dermatology or tropical diseases. Tentatively, the term "atypical lichen planus" has been adopted for this syndrome. Soldiers refer to it as "jungle rot." The disease under consideration is the most frequent cause of evacuation for skin diseases from the Southwest Pacific Area.

## Clinical Picture

As a rule, the patient spends three to six months in New Guinea or thereabouts before developing an eruption. This suggests that a sensitization develops. The first lesion usually appears on the leg, although the feet, hands, groins, or neck may be the primary site—for the most part, exposed areas. One to three months is usually required for the development of a general eruption. Occasionally, the onset is explosive, and a general edematous, desquamative dermatitis may develop in a few days. In such cases, it is reminiscent of the pre-mapharsen days of antisyphilitic therapy. At present, probably 75 percent of the patients are evacuated before the appearance of a generalized exfoliative dermatitis.

The lesions are basically of three types, two of which coexist in more than half of the patients. All the lesions probably are individual manifestations of the same process. The combined and intermediate cases are too common to allow for any other supposition at present. The first type of lesion consists of a lichen planus-like eruption. Clinically, the diagnosis of an aberrant type of lichen planus is made by competent dermatologists all over this country and in the Southwest Pacific. This dermatitis is usually of the hypertrophic type or closely mimics it. The lesions are purplish, coalescent nodules. The surface may be smooth, scaly, pseudodesquamative, or even verrucous. The mucous membranes of the mouth are often involved, but some extensive cases do not present such involvement. In some, marked atrophy or pseudo atrophy follows subsiding of the eruption. The localization may be general or confined to small areas. The face may be extensively involved. The palms and soles are frequently affected. The process does not tend to follow the usual lichen planus distribution, although the wrists and mucous membranes are usually affected. All in all, the lesions look like lichen planus but present many unusual features—including atypical localization, occasional atrophic sequelae, abnormal histologic features, lack of typical lichen planus papules, and marked hyperpigmentation. In addition, the frequent transformation into an eczematoid, exfoliative, dermatitis-like eruption is at best a very unusual manifestation of lichen planus. Here it is not uncommon.

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Submitted to The Surgeon General's Office on 18 September 1944. For security reasons, it could not be released until this time.

In the second form, the dermatitis is an eczematoid eruption especially affecting the legs, hands, forearms, neck, and ears. Weeping may be a prominent feature, more common in the more acute and severe examples. As a rule, there is an erythematous-violaceous hue. The lesions are flat and covered with a branny scaling such as found in the third type to be described. The underlying skin may be thickened. In some cases the dermatitis may resemble pellagra but does not show the sharp margination, the exacerbation on exposure to sunlight, the lingual changes, the

diarrhea, nor the dementia. Any part of the body may be affected. The weeping and scaling of the ears is one of the distressing manifestations. The nails may show changes such as those noted in eczematoid eruptions of the extremities. This type may progress to a generalized exfoliative dermatitis. The eruption bears a striking resemblance to the generalized form, the separation between the two forms being based on the extent of the eruption.

TABLE I  
*Location of lesions in 35 cases of localized eczematoid dermatitis*

Location	Cases
Legs	26
Hands	24
Arms	24
Ears	11
Face	10
Groins	9
Feet	8
Neck	4
Axillae	1

Table I shows the areas involved in 35 examples of this form.

The most serious manifestation is the generalized exudative, edematous, desquamative dermatitis. At first glance, the eruption is indistinguishable from the type of exfoliative dermatitis that occasionally follows the use of arsphenamine or nearsphenamine. The thickened skin is erythematous with a slightly bluish or coppery tinge. Desquamation is marked. Edema is most common on the ankles and feet but at times involves the face, hands, and legs. Fissuring may add to the patient's discomfort. The palms and soles may manifest a great deal of hyperkeratosis, desquamation, and cracking. Pruritus is severe and comparatively intractable. General lymphadenopathy may be marked, especially in the inguinal region. A moth-eaten type of alopecia very commonly accompanies the more severe cases. The loss of hair may be general over the body. The hair usually grows again with regression of the dermatitis. Marked involvement of the ears is common and upsetting. The nails show hypertrophy, atrophy, and splitting. There may be considerable heaping-up of subungual material. Onycholysis is comparatively frequent. A low-grade fever is common. As the dermatitis subsides, lichenoid papules often appear. Since all of these patients have been exposed to infected *Anopheles* mosquitoes, the complication of malaria must be considered in all febrile cases. In most instances, there is a marked yellowish discoloration of the skin that spares the sclerae. This is due to atabrine. The clinical differentiation from other types of exfoliative erythroderma is suggested by the history. Probably the findings of lichen planus-like nodules in a patient with general or local exfoliative dermatitis is the most important feature in the clinical diagnosis.

To determine the frequency of each type of dermatitis was impossible, as most patients manifested two or more types at some time during their course. Therefore, the predominant clinical features were tabulated at the time of observation. This revealed that 35 cases (53.8 percent) were of the localized eczematoid dermatitis type when seen. An additional 17 cases (26.1 percent) presented a general eczematoid, exfoliative, dermatitis-like eruption. The remaining 13 patients (20.0 percent) manifested an eruption of the lichen planus form. In one other case, the lesions mimicked disseminated lupus erythematosus. In another, a diag-

nosis of acquired ichthyosis, with cirrhosis, was justified by the clinical picture. However, considerable clinical improvement in the eruption resulted in time.

#### Complications

Separation of complications from the "clinical picture" is difficult and, of necessity, arbitrary. Many of the untoward sequelae are characteristic features of the disease. However, the following categories have been delineated.

*Pyogenic complications.* The actual incidence of this is difficult to ascertain, as none of the patients were followed throughout their course. However, purulent infections were seen in 12 cases. The most common type was an ecthyma manifested by a lesion that breaks down to form a dime-sized, punched-out ulcer, most common on the legs. Superficial pustules, pustulo-vesicles and ecthymatous crusted lesions were the second most common group of infections. Among the more serious complications encountered in this group were one example of each of the following: severe felon of thumb, breast abscess in a man, and two instances of abscess of cervical lymph nodes. All of these cases responded well to intramuscular penicillin therapy.

*Residual or recurrent dermatitis.* The frequency of this will be determined by the future. At present, two patients from the campaigns in the Solomon Islands are still suffering from recurrent eczematoid and exfoliative lesions more than a year after contracting their dermatoses. Apparently the eczematoid lesions are more likely to relapse than are the pure lichen planus type. It is predicted this will prove to be an important cause of disability in the future.

*Pigmentary changes.* Hyperpigmentation is marked as the lesions clear; in some, the changes suggest the pigmented residual of lichen planus; in others, it is more diffuse. Freckles and moles tend to become darker. The color may vary from brown to deep blue-black. Shades of brown are by far the most common. Depigmentation also occurs. One patient with a general exfoliative dermatitis developed on clearing a typical vitiligo of the hands; and, while all of his hair fell out, it regrew in its natural black color except for three coin-sized areas of pure white hair. In a Negro with lesions basically of the lichen planus type, many areas of hyperpigmentation persisted after the clearing of the eruption. But, in addition, there were multiple interspersed areas of vitiligo.

The pigmentary changes are not more marked on the exposed parts of the body than on the covered ones. The pigmented sequelae clear slowly, but the fate of the depigmentation is unknown.

*Disturbances in the sweat mechanism.* Many of the men returning from the tropics exhibit localized or generalized hyperhidrosis. This is not characteristic of the New Guinea area nor of those developing this cutaneous complex. Some of the patients exhibit this disturbance with severe dermatoses; temporary diminution in perspiration was common. One patient had a severe generalized exfoliative dermatitis. As this subsided, many lesions appeared that were clinically typical of lichen planus. The eruption healed with some atrophy of the skin. He noted, even before healing was complete, that he could not tolerate hot weather. Heat made him weak and dizzy. Examination at such time revealed a pulse rate of from 100 to 140 per minute and his oral temperature rose to 100° to 102° F., accompanied by a clinical anidrosis of the entire body except the forehead. Although less than 40 percent of the cutaneous covering was involved in active lesions or cutaneous atrophy after the clearing of the exfoliative dermatitis, it is felt that the tachycardia and fever were due to inability of the skin to maintain its sweating function.

*Other cutaneous diseases.* The only cutaneous disease to complicate the clearing of this dermatitis occurred in one patient who developed typical psoriasis, starting in the pigmented areas of the healed dermatitis. The preceding eruption was of the localized exfoliative dermatitis form. There was no personal or familial history of psoriasis preceding the appearance of the primary eruption. In view of the histologic resemblance of the exfoliative lesions to psoriasis, this observation is of interest.

*Psychogenic complications.* Although occasional periods of depression occurred, a certain euphoria was noted in these patients. Despite the severity of the process, intractability of the itching, and the comparative slowness of the healing, no significant psychiatric alterations developed in this series.

#### Laboratory Findings

The laboratory is not usually of great aid in these cases. The most important finding is hypoproteinemia in patients with edema. The albumin-globulin ratio approaches 1:1 instead of the normal relation of 2:1. Total serum proteins are usually between 4 and 5 mg. percent. This finding indicates therapy—a high protein diet and the use of plasma intravenously. The blood calcium is usually low, 8 to 8.5 mg. percent in severe exfoliative cases. This tends to resume a normal figure as the patients recover. The blood phosphorus is high, ranging from 4.5 to 5.5 mg. percent. This has been more persistent than the hypocalcemia. Urinalyses, serologic investigations, and stool examinations are not contributory. As a rule, neither anemia nor leukocytosis is noted in the blood. Eosinophilia is not a feature of the disease. One patient developed a fatal aplastic anemia one month after the onset of a localized exfoliative dermatitis. Blood chemistry has not shed light on the process.

#### Histopathology

In the biopsies representing all forms of this dermatitis, the alterations observed were worthy of much greater consideration than the scope of this report allows. The more common eczematoid type showed comparatively regular findings—consisting of parakeratosis, exfoliation of the corium, mixture of leukocytes and red blood cells with the keratin, normal or absent stratum granulosum, edema of the rete with prominence of the prickle cells, acanthosis, normal basal-cell layer or one undergoing hydropic degeneration, marked regular elongation of the papillae to simulate psoriasis, dilatation of the vessels, and edema of the upper portion of the derma. A dense cellular infiltrate was present from polymorphonuclear leukocytes in the acute phase to lymphocytes in the chronic phase and with some eosinophils, fibroblasts, and histiocytes. While this infiltrate was basically superficial, it had a tendency to surround the hair follicles, sebaceous glands, and sweat glands and to dip into the deeper portions of the corium. The skin appendages were normal.

In the lichen planus forms, the picture varied. In some, typical lichen planus was present with thickening of the stratum granulosum, the plate-like acanthosis, and the superficial bandlike infiltrate. In others, the architecture resembled that described as characteristic of the eczematoid lesions; in many, features of both types were present in the same section. In some, atrophic changes were prominent. In two, follicular plugging, hyperkeratosis, widely patent follicles, hydropic degeneration of the basal-cell layer, atrophy of the epidermis, superficial perivascular, perifollicular and periglandular infiltration suggested lupus erythematosus. The pigmentary changes were found to be produced by clumps of pigment in the upper portions of the derma. Both intracellular and extracellular masses were seen.



### Prognosis

The eruption starts to improve, as a rule, as soon as the patient leaves the Southwest Pacific. Most patients improve so rapidly on the trip home and in the first few weeks in this country that they develop a euphoria. Although the eruption may be severe enough to worry the most optimistic dermatologist, the comparative improvement is so great as to fill the patient with unwarranted optimism. The unwary dermatologist is often trapped into a false sense of security.

Clearing often requires many months to complete. Temporary exacerbations and recurrences are the rule—especially with the eczematoid lesions, either the localized or generalized type. The percentage of recurrences can be determined only by future observations. The severe generalized hypertrophic lichen planus lesions clear without treatment on return to this country, although it also requires months to complete. Pruritus is usually much less marked in the pure lichen planus type than in those with eczematoid lesions. The prognosis seems better in the lichenoid examples than in those with desquamative changes. Death occurred in one patient with aplastic anemia and toxic hepatitis.

Besides the loss in man-days, this dermatitis renders unfit for further active overseas duty many valuable men. The eruption is no respecter of persons. I have now three colonels and two nurses under treatment.

The exacerbations are disheartening, to both patient and physician. Some patients with eczematoid, exfoliative-like dermatitis eventually lose their euphoria and become despondent because of the slow improvement, incessant itching, and the heartbreaking flare-ups. Some patients who developed this type of eruption in the Solomons campaign still show activity more than a year after the onset of the condition.

### Etiology

While this subject could be disposed of with the statement that at present the cause is unknown, some theories merit consideration.

*Atabrine.* All of the patients had been taking atabrine, usually for a long time before the eruption appeared. Atabrine is excreted through the skin, the yellowish discoloration being ample proof. An analogy to the arsenic-caused lichen planus lesions is also suggested. In 1942, Noojin and Callaway<sup>1</sup> reported a case of exfoliative dermatitis due to atabrine. Duemling<sup>2</sup> is said to have reported two cases of exfoliative dermatitis apparently due to atabrine. Mitchell<sup>3</sup> listed two patients with lichen planus presumably due to the same drug. In this series, patch tests with atabrine have given negative results, although an occasional positive reaction has been reported. Atabrine wet dressings have not increased the severity of the process, and several patients have taken atabrine for attacks of malaria without aggravation of the dermatitis. These findings will require further evaluation.

*Contact dermatitis.* Most of the available evidence points to the importance of environment. The frequency of this form of eruption in the vicinity of New Guinea supports this contention. The onset is noted after a trip into the jungle, and improvement follows removal from this area. The importance of plants, mosquito repellents, coral, and other things in this environment is not known. The vegetation is profuse. Many of the plants are not present in more temperate climates. In some

1. Noojin, R. O., and Callaway, J. L.: Generalized Exfoliative Erythroderma Following Atabrine, North Carolina M. J., 3:239-240, May 1942.

2. Duemling, W. E.: Cutaneous Diseases in the South Pacific, Arch. Derm. Syph., Chic., 52:75-86, Aug. 1945.

3. Mitchell, J.: To be published.

cases personally observed, patch tests with some woods and vegetation have been negative. However, the tests done and cases thus studied are too few to be of value. As some patients were serving in fixed installations, it is doubtful if the living conditions were at fault. High ranking officers and nurses are affected as well as soldiers who live in foxholes.

While one often sees lichenoid papules in dermatitis venenata in this country, I have never observed hypertrophic lichen planus as the result of an external contact. Such an occurrence may be possible, but these lesions cast doubt on the hypothesis that this eruption is an externally caused dermatitis.

*Mycoses.* Many patients and physicians consider that mycotic infection is of prime importance in the development of these eruptions. The occasional onset on the feet or groins is sometimes considered important. The frequent involvement of the feet and groins in an eczematoïd process is also considered significant. The lesions may superficially resemble a dermatomycotic infection. However, many features argue against this conception. The incidence of preceding or accompanying "athlete's foot" is no greater than among civilians in this country. Fungi are not found in the exfoliative lesions, either by microscopic examination or by culture. Most patients deny the presence of an eruption on the feet prior to going overseas. The course of the disease with improvement with soothing remedies but with acute exacerbations and relapses also argues against an infectious basis of any kind. Furthermore, the eruption eventually subsides without use of parasitocides. In fact, most patients receive fungicides at some time in the course of their disease, usually with resulting aggravation of the process. As in the case of dermatoses on the hands, fungus infection is diagnosed more often than it exists.

*Infectious process.* No evidence of contagion has been offered or observed. The febrile reaction is usually minimal. The clinical course as described is that of a hypersensitization. The importance of malaria, which often coexists with the dermatitis, is also doubtful because of the limitation of the dermatitis to this geographic area.

*Dietary.* The soldier in combat in the jungles of New Guinea undergoes privations and a reduced diet. Patients with severe dermatoses usually lose 10 to 30 pounds. However, in localized forms, there is usually no loss of weight. Clinical evidence of dietary deficiency in these patients is not available. They do not show night blindness, perleche, lingual changes, pellagra, scurvy, etc. However, there is an abnormality of keratinization as evidenced by the scaling that suggests a possible vitamin A deficiency. The edema due to hypoproteinemia offers the possibility of vitamin B deficiency. The use of thiamin chloride, riboflavin, nicotinic acid amide, vitamin B complex, and ascorbic acid in adequate amounts has not affected the clinical picture perceptibly. The administration of large doses of vitamin A is now being studied.

*Predisposing factors.* Very few patients admitted having a dermatitis when they reached the Southwest Pacific. One gave a history of a dermatitis of the hands two years previously. One developed a dermatitis in California which cleared on the boat and remained well in New Guinea. However, it recurred on his return to Australia and eventually led to his evacuation. Another with chronic eczema spent sixteen months in New Guinea without aggravation of her dermatitis. Any dermatomycotic infection that may have existed prior to the onset of the dermatitis must have been minimal, as most denied knowledge of such an infection. Furthermore, examination of the patients after return to this country seldom showed any clinical evidence of pedal dermatomycosis. Allergy

as evidenced by personal and family history did not play a major role in these patients. This is consistent with a contact type of dermatitis. Psychic influences seemed to be of some importance in those evidencing the lichen planus form.

Most of the patients were men as would be expected in any combat group. However, two nurses and a female Red Cross worker were severely affected. Considering the number of white women in New Guinea, this is in proportion to the men. Race did not seem important. Examples were seen in brunets, even more commonly than in blonds. Mexicans, Negroes, and Filipinos were seen with this eruption.

TABLE II  
*Ages of 65 patients with all forms of this lichen planus-eczematoid dermatitis complex*

Age	Cases
20 to 24	10
25 to 29	22
30 to 34	10
35 to 39	13
40 to 44	4
45 to 49	2
50 to 54	2
55 to 59	2

The age incidence is shown in table II. The most interesting finding is that more than 35 percent of the patients were older than 35 years of age. This seems rather high, as the draft age extends only to 38.

#### Therapy

Treatment is nonspecific and not too efficacious. Soothing applications, especially oily ones add to the patient's comfort. Wet dressings decrease the weeping. Burow's solution in a 1:15 strength seems the most effective. Potassium permanganate solution (1:9,000) is of value in the presence of a secondary infection. Equal parts of Lassar's paste (without acid) and unguentum aqua rosae make a soothing application, especially in the presence of fissures. Coal tar in the form of ointments, paints, or baths is of value, particularly after the subsidence of the acute phase. Starch and soda baths, either intermittent or continuous, help in maintaining the patient's comfort.

Sulfonamides and penicillin do not affect the basic eruption unless there are complicating tropical ulcers or infections. In such instances, penicillin is indicated. Injections of bismuth salts, Fowler's solution, and intravenous arsenicals are not advised.

In view of the hypoproteinemia and edema, the patients with more severe eruptions should be put on a high protein diet. Intravenous infusions of plasma are also indicated in such cases. Hypocalcemia suggests a high calcium, high vitamin D diet. Extra vitamins may be given.

Prolonged hospitalization seems necessary, although some patients feel that they get worse after hospitalization. Early evacuation from the Southwest Pacific is indicated. Prompt action when the complex first appears would probably decrease hospitalization considerably. The patients do better once they are removed from the endemic area. This is probably the most important therapeutic measure. The intravenous injection of 10 percent glucose with insulin and thiamin chloride has been studied, and it is apparently of less benefit than in the arsenic-caused exfoliative eruptions.<sup>4</sup> Superficial roentgen-ray therapy is also being used, but the results to date have been indeterminate.

#### Discussion

This lichen planus-eczematoid dermatitis complex of the Southwest Pacific is probably the most important cutaneous entity in the service today. From the standpoint of frequency, it overshadows all other derm-

4. Epstein, E.: Postarsphenamine Exfoliative Dermatitis, J.A.M.A., 109:117-121, 10 July 1937.

atoses as a military problem. In regard to morbidity and discomfort, it ranks high on the list of all eruptions, civilian or military. However, there is the cheering probability that its importance will wane with the cessation of hostilities in this area.

On the other hand, the future of these sufferers is questionable. The frequent mild relapses suggests that these men and women may become permanent "dermatological cripples." Their skin may prove abnormally sensitive to many possible irritants because of the "insult" it has suffered. Some patients still show activity more than a year after the onset of the dermatitis. These patients may prove an important factor in future civilian dermatology. Further studies, especially on etiology, prognosis, and therapy, are urgently indicated and are being carried out by various investigators. For that reason, further knowledge probably will necessitate modification of some statements made in this communication.

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## Reactions to Penicillin

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In the many articles on penicillin, reactions have been considered relatively unimportant. The complications described have been largely urticarial, frequently transient, and not requiring interruption of therapy. The present study deals with the serious and unusual reactions observed in some 2,000 soldiers receiving prolonged courses of penicillin. In about 0.5 percent of this group, the reactions were so severe that penicillin therapy was discontinued. Skin testing with penicillin was done in many of the cases, as well as in a control group of 116 persons. After the reactions simulating dermatophytosis were first seen, a careful history was taken for previous fungus infection and skin testing with trichophytin was done. In addition, intradermal testing with penicillin and trichophytin was performed on a group of persons with previous dermatophytosis.

Case reports of the various types of reactions will be presented and the results of skin testing summarized. The reactions are classified as follows: (1) urticaria, complicated by (a) angioneurotic edema, (b) shock, (c) convulsions, and (d) psychotic depression; (2) serum sickness-like syndrome; (3) acute syncope; (4) transient miliaria-like eruptions; (5) erythema-vesicular eruptions, at times simulating dermatophytosis; (6) erythema nodosum; and (7) epididymitis.

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Major Harold R. Vogel, M.C., A.U.S., and Major Raymond C. V. Robinson, M.C., A.U.S., collaborated in this study.

CASE 1. *Urticaria and angioneurotic edema.* A soldier, aged 43, had a negative past history except for mild dermatophytosis three years ago. Penicillin therapy was given for a sycosis vulgaris, eight doses of 20,000 units being administered intramuscularly every three hours, without reaction. A month later, penicillin therapy was resumed and after nine days of treatment the patient developed scattered urticarial lesions. A last injection four hours later resulted immediately in generalized erythema and urticaria. This became increasingly severe over a twenty-four-hour period, with massive edema of face, hands, and feet; headache; nausea; and marked dyspnea. The eruption remained severe for forty-eight hours; then gradually involuted during the next three days. Four days later, an intradermal test with 250 units of penicillin sodium was strongly positive, resulting in a mottled erythema over the entire forearm in thirty seconds, followed first by small urticarial lesions on the forearm, and then a few erythematous and urticarial lesions on the other forearm and upper trunk. The intradermal reaction persisted for twenty minutes, while the urticarial lesions remained for one hour. There was no delayed reaction. Intradermal tests with trichophytin elicited strongly positive immediate and delayed reactions. A week later intradermal tests with penicillin incubated with homologous serum, and with homologous serum alone, were negative, but scattered urticarial lesions appeared over the trunk. A test with penicillin alone elicited a control type of reaction.

CASE 2. *Urticaria, angioneurotic edema, and shock.* A soldier, aged 25, was hospitalized for a chronic sycosis vulgaris. He had been given two courses of penicillin four and two weeks before admission for a penetrating wound. Penicillin ointment, 50,000 units per ounce of lanette wax base, was prescribed for the residual sycosis and within twenty-four hours mild urticaria was noted on the extremities. Penicillin therapy was continued for another day with a resulting solid edema of the face and marked generalized urticaria. He became semicomatose, the pulse was rapid and thready, and signs of pulmonary edema appeared. Involution occurred in two days with symptomatic therapy. Intradermal tests were then done with penicillin, penicillin in blood serum, and serum of a patient who was receiving penicillin. All tests were negative.

CASE 3. *Urticaria and angioneurotic edema, complicated by convulsions.* A soldier, aged 26, had subacute dermatophytosis two years ago. He was hospitalized with a peritonsillar abscess and was given 20,000 units of penicillin intramuscularly every four hours for twelve days. The infection gradually subsided. Generalized urticaria of the face, hands, and feet developed eight days after treatment was stopped. Three days later, the urticaria was complicated by repeated generalized convulsions which lasted half an hour. Consciousness was regained six hours later, and he became rational after an additional four hours, but weakness, dizziness, and confusion persisted for another six days. Following the convulsive period, spinal fluid examination revealed a normal protein, a moderate increase in lymphocytes, and a few red blood cells. The urine, previously normal, showed a 2-plus albumin and numerous red blood cells, but became negative in forty-eight hours. The patient was re-examined three weeks later, at which time the physical examination, urinalysis, and spinal fluid were normal. The electroencephalogram revealed cerebral dysrhythmia characteristic of grand mal epilepsy. A skin test with penicillin elicited a control type of immediate reaction. There was a delayed reaction to trichophytin.

CASE 4. *Urticaria and psychotic depression.* A soldier, aged 29, had a mild dermatophytosis three years ago. Penicillin ointment, 500 units per

gram of water-soluble base, was administered for a chronic infectious eczematoid dermatitis of the face. The dermatitis improved for two days, following which local erythema and urticaria were noted. A fiery erythema appeared in the nasal and oral mucosa. Penicillin was continued for three more days, but the urticaria became worse and treatment was stopped. On the following day, massive edema developed on the face, forearms, and legs. He became agitated, depressed, and confused. The temperature was 102° F., there were arthralgias of the shoulders, hip and knee joints, and signs of pulmonary edema. The fever and pulmonary edema subsided in the next three days, the cutaneous lesions and the nervous symptoms disappeared gradually during the following week, while the arthralgias persisted for another three weeks. After partial recovery, skin testing was done. Patch tests with penicillin solution, 1,000 units in 0.1 cc., and with penicillin ointment resulted in raised erythematous areas after thirty-six hours of contact. There was no reaction to the ointment base. An intradermal test with penicillin did not produce an immediate response, but twenty-four hours later the injection site became necrotic. From this area, two tortuous erythematous trails extended a few inches up the arm. There was no reaction to trichophytin.

These cases demonstrate that urticaria may progress to angioneurotic edema and lead to even more serious complications. In the four cases cited, the reactions were of such severity that penicillin therapy had to be terminated. Case 1 was sensitive to penicillin for at least six weeks following the urticarial reaction. This is contrary to the belief of Lyons,<sup>1</sup> who stated that the period of sensitization is transient and that therapy usually may be continued. In the patient with shock, further penicillin therapy might have led to a fatal outcome. In case 3, a latent tendency to epilepsy, as shown by the subsequent electroencephalogram, became clinically manifest as result of the severe penicillin reaction. Case 4 demonstrates that severe reactions may be precipitated by local penicillin therapy.

*CASE 5. Serum sickness-like syndrome.* A soldier, aged 27, was treated for primary syphilis with 2,400,000 units of penicillin over a seven-and-one-half-day period. Two days after treatment was completed he developed a severe generalized urticaria, moderate arthralgias, painful enlarged lymph nodes, pallor, and weakness. Examination revealed an involuting primary lesion, marked urticaria, acute doughy enlargement of the cervical, axillary, and inguinal nodes, a secondary anemia of 3,200,000, and an eosinophilia of 6 percent. The elbow, knee, and ankle joints were slightly swollen and painful. The urticaria involuted after five days, the arthralgias after ten days, and the anemia after three weeks. Serum therapy had not been given during the past year.

Two similar cases have been observed. In one, the urticarial lesions were complicated by joint effusions and, also, by severe abdominal cramps and edema of the glottis. The second patient had a history of previous dermatophytosis, and intradermal testing was done with penicillin and trichophytin. The immediate reaction to penicillin was similar to

1. Lyons, C.: Penicillin Therapy of Surgical Infections in the U. S. Army, J.A.M.A., 123:1007-1018, 18 Dec. 1943.

that seen in controls, while delayed reactions to penicillin and to trichophytin were positive.

**CASE 6. *Acute syncope.*** A soldier, aged 22, was given penicillin intramuscularly for bronchitis. Temporary nervousness and muscular tremors were noted ten minutes after the initial injection of 20,000 units. A second injection three hours later resulted in mild weakness, partial syncope, and generalized tremors. Twenty minutes later he became cyanosed, vomited, and lost consciousness. The attack subsided in fifteen minutes. Four hours later, an area of erythema, 5 cm. in diameter, was noted at the site of the last injection, persisting for twenty-four hours. There was a history of three attacks of dermatophytosis during the past six years. Three days after recovery, intradermal tests were done with penicillin and trichophytin. There was an immediate reaction to penicillin similar to that seen in controls. Trichophytin elicited strongly positive immediate and delayed reactions.

This patient developed an anaphylactic-like reaction to initial doses of penicillin. Previous therapy with penicillin had not been given. An inherent hypersensitivity to penicillin may have been present, but it is significant that the patient had suffered from repeated attacks of dermatophytosis, and had a markedly positive intradermal reaction to trichophytin. Jadassohn<sup>2</sup> has shown by Schultz-Dale tests in sensitized guinea pigs that pathogenic fungi contain not only a specific antigen but also another antigen common to all fungi. It is possible that a previous fungus infection which has resulted in tissue sensitization to the antigens of the fungus may sensitize the patient to penicillin, a product of the fungus, *Penicillium*. Moreover, this sensitization may not be limited to the skin.

**CASE 7. *Transient miliaria-like eruption.*** A soldier, aged 24, was given penicillin for primary syphilis, a total of 2,400,000 units being administered in seven and one-half days. Six days after the completion of therapy, a pruritic miliaria-like eruption, consisting of minute vesicles, appeared over the trunk and extremities. The lesions were transient, and involution was complete in one week. Intradermal and patch tests with penicillin and an intradermal test with trichophytin were negative.

Four other patients with miliaria-like reactions to penicillin have been seen. All occurred during therapy, on the third, fourth, seventh, and eighth days respectively. In three, the eruption was transient, involuting despite continuation of penicillin. In the fourth case, the reaction persisted throughout the period of treatment. Three of these five patients had previous active fungus disease, and four of the five experienced a peculiar, rather marked residual desquamation of the palms.

**CASE 8. *Eruption simulating dermatophytosis.*** A soldier, aged 30, was given penicillin intramuscularly for an acute sinusitis. Four hours after the initial injection of 20,000 units, marked pruritus was noted between the toes. Ten hours later, the skin of the toes and interdigital spaces

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2. Jadassohn, W., Schaaf, F., and Wohler, G.: Analyses of Composite Antigens by the Schultz-Dale Technique: Further Experimental Analyses of Trichophytin, *J. Immun.*, Balt., 32:203-227, Mar. 1937.



became erythematous; after another eight hours, maceration, erythema, and fissuring appeared between the toes. Simultaneously, a vesicular eruption developed over the toes, the anterior portion of the feet, and the fingers, and penicillin therapy was stopped. The pruritus and erythema gradually disappeared over a twelve-hour period, and the vesicular lesions during the next ten days. The white blood count, which previously had been normal, showed a 7 percent eosinophilia at the height of the reaction. An intradermal test with penicillin showed a control type of reaction. Scrapings of the involved skin were negative for fungi. There was no history of previous fungus disease, but an intradermal test with trichophyton gave an immediate positive reaction, and it is probable that a mild infection had been present.

This case re-emphasizes the apparent relationship between penicillin reactions and superficial fungus disease. Graves, Carpenter, and Unangst<sup>3</sup> have reported vesicular eruptions in two patients with a history of previous dermatophytosis of the feet and a vesicular dermatophytid of the hands. The vesicular lesions were confined to the hands in one case, while in the other, vesicular lesions of the hands and feet were complicated by maceration and oozing in the groins. In both of their cases, the reaction developed within twenty-four hours after starting penicillin, suggesting a pre-existing sensitivity. Intradermal tests with penicillin were negative in one and positive in the other, while trichophyton elicited positive reactions in both instances. The authors stated that the reactions in their two cases might have occurred on the basis of a sensitivity to an antigen common to all fungi.

CASE 9. *Erythema-vesicular eruption*. A soldier was given penicillin intramuscularly for chronic pyoderma. He had never been previously treated with penicillin. Pruritus of the face and hands was noted after the sixth injection; after two more doses, the patient developed edema of the eyelids and erythema-vesicular lesions of the face and neck, and penicillin was discontinued. During the next six hours, diffuse vesicular lesions on an infiltrated base appeared on the dorsum of the hands and wrists and in the antecubital spaces. The process gradually involuted with residual exfoliation during the next three days.

This reaction was clinically distinct from that in case 8, and it was felt that continued therapy might have precipitated an exfoliative dermatitis.

CASE 10. *Erythema nodosum*. A soldier, aged 22, was given 2,400,000 units of penicillin intramuscularly in seven and one-half days for secondary syphilis. The lesions involuted rapidly under treatment and the reagin titer of the blood Kahn test fell from 360 to 40 units in that period. Three days after the completion of therapy, a few painful erythematous nodules appeared on the pretibial surfaces. New lesions continued to develop during the next ten days, despite the involution of the syphilitic process. Biopsy of a node revealed findings typical of erythema nodosum. No foci of infection were found, the sedimentation rate and x-rays of the lungs and tibia were normal, and the tuberculin skin test was negative in a 1:1,000 dilution. The eruption involuted spontaneously in three and one-half weeks.

3. Graves, W. N., Carpenter, C. C., and Unangst, R. W.: Recurrent Vesicular Eruptions Appearing During Administration of Penicillin, Arch. Derm. Syph., Chic., 50:6-7, July 1944.

The cause of this reaction could not be determined. The delayed appearance of the lesions ruled out the possibility of a Herxheimer reaction. Erythema nodosum is rare in early syphilis. Furthermore, it is improbable that it would develop while syphilids were involuting as a result of therapy. Conceivably, the lesions might result from antigenic substances liberated from an incidental focus of infection by penicillin, but no such focus was found. It is possible that the lesions were a reaction to penicillin *per se*. The onset ten days after the institution of penicillin therapy approximates closely that seen in developing sensitizations of various types.

CASE 11. *Epididymitis*. A colored man, aged 27, was given intramuscularly a total of 2,400,000 units of penicillin in seven and one-half days for early secondary syphilis. On the third day of treatment, a tense, painful swelling developed in the globus major of the left epididymis. Inflammation of the globus major is usually hematogenous in origin. However, no focus of infection was found. The epididymitis subsided in one week with symptomatic treatment, while the clinical manifestation of syphilis involuted promptly with penicillin.

Epididymitis is rare in secondary syphilis. The occurrence of the complication early in therapy suggests the possibility of a Herxheimer reaction. Rosenberg and Arling<sup>4</sup> have reported ten instances of epididymitis in sixty-five cases of meningococcic meningitis treated with penicillin. Their protocols do not state whether the epididymitis occurred prior to, during, or subsequent to the administration of penicillin. However, epididymitis is a rare complication of meningitis treated with agents other than penicillin, and it seems plausible that penicillin may be concerned in the complication. One possibility is that toxic products of rapidly destroyed meningococci may produce this reaction in a highly vascularized and sensitized tissue. Another possibility is that penicillin may destroy organisms which ordinarily inhibit the growth of certain non-pathogenic bacteria. Under these circumstances, nonvirulent organisms may become pathogenic in susceptible tissues.

#### COMMENT

The diversity of reactions to penicillin is well illustrated by the cases presented. Additional types of reactions have been reported. Silvers,<sup>5</sup> Pyle and Rattner,<sup>6</sup> and Binkley and Brockmole<sup>7</sup> have each reported a case of contact dermatitis from penicillin. Patch tests were positive to commercial penicillin in two cases and to crystalline penicillin in the third. Wrong<sup>8</sup> has described contact dermatitis of the face from penicillin ointment, confirmed by positive patch tests. However,

4. Rosenberg, D. H., and Arling, P. A.: Penicillin in the Treatment of Meningitis, J.A.M.A., 125:1011-1016, 12 Aug. 1944.

5. Silvers, S. H.: Contact Dermatitis from Amorphous Sodium Penicillin, Arch. Derm. Syph., Chic., 50:328-329, Nov. 1944.

6. Pyle, H. D., and Rattner, H.: Contact Dermatitis from Penicillin, J.A.M.A., 125:903, 29 July 1944.

7. Binkley, G. W., and Brockmole, A.: Dermatitis from Penicillin, Arch. Derm. Syph., Chic., 50:326-327, Nov. 1944.

8. Wrong, N.: Personal communication.

most of the reactions from penicillin have been caused by the systemic effect of penicillin, whether administered parenterally or locally, rather than by direct local action. Keyes<sup>9</sup> has described a severe allergic reaction following the instillation of a solution of penicillin in the eyes. This consisted of edema of the eyelids, acute conjunctivitis, congestion of the pharyngeal mucosa, and low-grade fever. Petechial lesions were noted by Graves and his co-workers.<sup>3</sup>

Intradermal tests with three brands of commercial penicillin sodium were performed on 116 persons, 42 being tested with brand 1, 35 with brand 2, and 39 with brand 3. During the previous three months, 29 had been given intramuscular penicillin therapy and 7 had received applications of penicillin ointment, all without reactions. Unfortunately, inquiries were not made regarding previous fungus infection. Of the 116, 57 percent had positive reactions. Of these, 29 percent developed a mottled and 28 percent a solid erythema, the former varying from 1 to 10 cm. in diameter, and the latter from 1 to 5 cm. The reaction generally appeared within five minutes, reached its maximum in from ten to fifteen minutes, and disappeared in from twenty to forty-five minutes. Positive reactions developed in 23 percent of patients tested with brand 1, 65 percent with brand 2, and 84 percent with brand 3. One severe reaction was encountered with brand 1, one with brand 2, and five with brand 3. There was no correlation between the development and severity of the reactions and the darkness in color of the preparation; however, the bulkiest preparation gave the most frequent and severe reactions. The incidence of reactions was not elevated significantly in patients treated previously with penicillin. However, the four patients reacting with solid erythema from 2.5 to 5 cm. in diameter fell in this group. The large number of nonspecific positive reactions to penicillin in the control group is unquestionably due to impurities. This was shown by the variable percentage of reactions to the different brands.

Another group of 17 patients, all with previous acute or subacute fungus disease and not previously treated with penicillin, were tested intradermally with both penicillin and trichophytin. Fifteen, or 88 percent, had immediate reactions to penicillin varying from 1 to 10 cm. in diameter, but none showed delayed reactions. Eight had both immediate and delayed reactions to trichophytin, while five others had delayed reactions. The skin tests in patients with dermatophytosis were compared with those in the control group tested with the same brand of penicillin. Strongly positive reactions (5 to 10 cm. in diameter) occurred in 35 percent of the former group and in only 3 percent of the controls. This finding suggests that patients with previous fungus disease are more apt to develop

9. Keyes, J. E. L.: Penicillin in Ophthalmology, J.A.M.A., 126:610-615, 4 Nov. 1944.

reactions to penicillin than those without such disease. Welch and Rostenberg<sup>10</sup> found tuberculin-type reactions to crystalline penicillin in but 5 percent of a group of 140 persons previously untreated with penicillin. It would be interesting to know what proportion of this 5 percent had previous active fungus disease.

A study of reported and personally observed penicillin reactions has shown that skin testing with commercial solutions of penicillin is of limited diagnostic value. In several patients with severe clinical reactions to penicillin, the results of skin tests with penicillin were identical with those seen in controls. An immediate intradermal reaction of more than 10 cm. in diameter was considered a contraindication to further therapy, since reactions of this size were not seen in controls. However, the presence of negative intradermal tests during and subsequent to some of the more serious reactions indicates that clinical judgment in each case is more important than the information obtained from skin testing.

As before stated, sensitivity to penicillin may last for a considerable period. In a personally observed, unreported patient with a scattered erythematous-vesicular eruption, intradermal tests three and thirty-seven days after clinical involution were strongly positive, the erythematous flares involving practically the entire upper extremity. Crip's patient<sup>11</sup> developed a recurrence of urticaria several months after involution of the initial attacks when penicillin therapy was attempted.

The mechanism of reactions to penicillin has not been determined. According to Fineberg,<sup>12</sup> patients with clinical reactions to penicillin are not sensitive to an extract of *Penicillium* spores. Commercial penicillin contains about 35 percent of impurities, and many of the reactions now seen may not occur when crystalline penicillin becomes available. Silvers' patient,<sup>5</sup> in whom a positive patch test was obtained with commercial but not with crystalline penicillin, tends to confirm this impression. However, the case of Pyle and Rattner<sup>6</sup> had a positive patch test to crystalline penicillin, and the question is far from settled. Skin tests with the corn extracts in which *Penicillium* is grown have been negative or of doubtful significance.<sup>6 9 10</sup>

It appears that the principal shock tissue in penicillin reactions is in the blood vessels rather than the epidermis, although the latter may be sensitized in some instances.<sup>5 6 7 8</sup> Even the vesicular reactions have a marked element of erythema. Moreover, the reactions complicated by shock, convulsions, or psychosis may have been precipitated by involvement of deeper blood vessels. Although the primary shock tissue

10. Welch, H., and Rostenberg, A., Jr.: Hypersensitivity of the Tuberculin Type to Crystalline Penicillin Sodium, J.A.M.A., 126:10-12, 2 Sept. 1944.

11. Crip, J. H.: Allergy to Penicillin, J.A.M.A., 126:429-430, 14 Oct. 1944.

12. Fineberg, S. M.: Penicillin Allergy, J. Allergy, 15:271-273, July 1944.

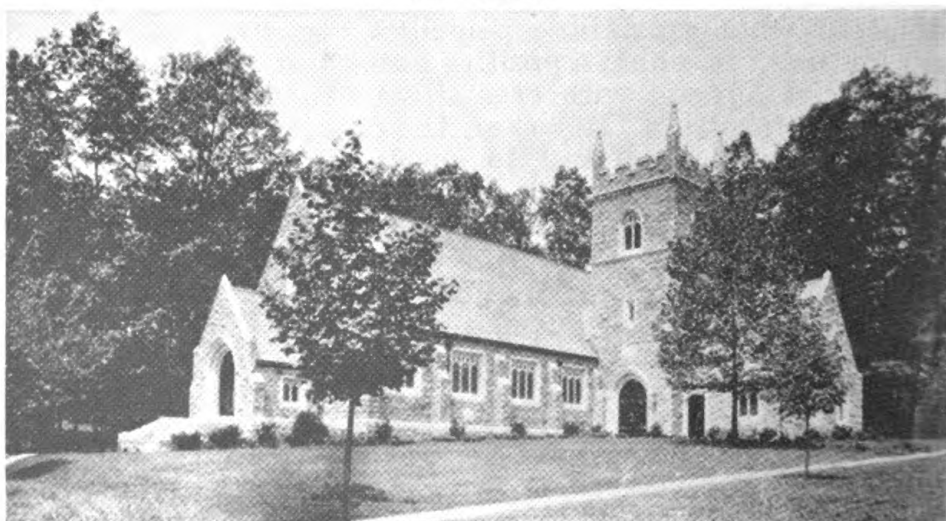
appears to be the vascular bed, consistent evidence of circulating antibodies has not been found. Heterophil agglutinins have not been significantly increased,<sup>1</sup> while precipitin and passive transfer tests have yielded variable results.<sup>1 10 11</sup>

The reactions to penicillin have been of two main types—those appearing shortly after first exposure to the drug and those occurring at a later date as a result of developing sensitization. Those in the first group are surely due to pre-existing hypersensitivity to penicillin, which may be inherent or may occur as a result of a previous fungus disease. In the second group, reactions may occur later in the first course of treatment, shortly after its termination, or at various times during subsequent courses. The reactions in this group are indicative of a developing sensitization to penicillin. Here again, previous fungus disease may enhance the development of reactivity to penicillin. The findings in several personally observed cases seemed to confirm this point, but further studies should be made.

#### SUMMARY

Serious reactions have been encountered in about 0.5 percent of patients treated with penicillin. Reactions may occur shortly after initial exposure to penicillin as a result of an existing hypersensitiveness or at later intervals because of developing sensitization. Both early and late reactions may be serious in nature and require discontinuation of therapy. From clinical observations, it appears that the primary shock tissue in most penicillin reactions is the vascular bed.

Intradermal testing with penicillin has been of limited value as an aid in diagnosis and a guide for further treatment. Increased reactivity to penicillin may occur on the basis of a previous acute fungus disease.



Walter Reed Chapel, Army Medical Center, Washington, D. C. Signal Corps photograph.

## Mobile Medical and Dental Dispensaries

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and

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The medical detachment serving an engineer aviation battalion consisted of a medical section and a dental section staffed by one medical officer, one dental officer, one medical administrative officer, and fourteen surgical and medical technicians. Prior to the development of the improved methods described in this report, it was the general procedure of the medical detachment to establish a battalion dispensary and aid station consisting of two pyramidal tents to shelter the dispensary, medical supplies, and equipment, while one small wall tent furnished enough room for the dental dispensary. The medical detachment was always located near the battalion headquarters.

This battalion has made eight complete moves in eleven months overseas, including two initial landings. The efficient functioning of the medical detachment frequently depends on its portability. The method of setting up in tents as described above had the following disadvantages: (1) loss of precious medical supplies and equipment, and (2) unavoidable delay before the men of the battalion could be given the best possible medical attention. Loss of supplies and equipment occurred through spoilage from rain and ground rot all through New Guinea and Netherlands East Indies. The excessive rains of the tropics eventually leaked through the tents, while lumber for flooring and shelf space to keep supplies off the ground was seldom available in the forward areas. Pilfering of supplies occurred with every move and in every location where supplies could not be inclosed and locked. Breakage was common when supplies had to be moved in crates. Probably the loss of time in setting up in a new locality was even more serious because medical attention may be most urgent during the first few days. The setting up of tents, opening of boxes, and preparation of shelves and storage space at each new locality required valuable man-hours which were not always available.

Largely because of the tireless efforts of Staff Sergeant James E. Gratz, surgical technician, and the cooperation of the enlisted men of the detachment as well as other sections of the battalion, all these disadvantages have been entirely eliminated by the construction of two trailers designed and built from mate-

rials available in combat zones. These trailers were designed to make the medical section dispensary and the dental section completely mobile and to provide continual accessibility to equipment



FIGURE 1. Side view of dental trailer.

and supplies for immediate use, a permanent elevated flooring, insectproof dispensaries, and ample dry storage space for all equipment plus a thirty-day medical supply stock. Construction of the trailers began when we were able to obtain the chassis with dual wheels of two 21½-ton trucks which had been damaged beyond repair by enemy action. These were released through ordnance salvage, the chassis being disengaged from the wreckage by the men of the medical detachment. The anterior ends of each truck frame were bent together and welded into an iron ring which can engage the trailer hitch of any Army 21½-ton or larger truck by which the trailers can be towed easily. The flooring and frames of the trailers are constructed of lumber heavy enough to withstand the stress of being lifted on slings to the deck of a Liberty ship. The roof, adjustable awnings, and lower two-thirds of the outer walls are covered with corrugated iron; the upper one-third of the walls is screened with mosquito wire. While the trailer is being moved, the awnings are latched down, the steps are put inside the trailer, and the entrance platform folds up against the front.



FIGURE 2. Interior view of medical trailer. Storage cabinets of plywood, with sliding doors to conserve working space.



FIGURE 3. Interior front of medical trailer showing examining table and built-in desk.

The interior dimensions of the medical trailer are 16 ft. in length, 8 ft. in width, and 6½ ft. in height. Enough cupboard space was built to accommodate at least a thirty-day medical supply. The lower cabinets at the rear



are large enough to accommodate the M.D. Chests and larger boxes. To conserve working space, sliding doors were used on the cabinets which are constructed waist-high and covered over with sheet metal to provide plenty of table space easy to keep clean (figure 2). The right anterior corner of the trailer is devoted to a built-in desk and typewriter with sufficient drawer space for all medical records. In the left anterior corner is a low storage cabinet on which is built an examining table 6 feet long (figure 3).

The 30-gallon water storage tank is mounted outside near the top at the rear of the trailer. The water is piped to a control tap over an aluminum sink. The upper cabinets on the rear wall of the trailer contain surgical instruments, sterile bandages, sterile towels, and rubber gloves. One section devoted to narcotics can be locked. Electricity is furnished by the headquarters and service company. Both trailers are sufficiently well wired to provide adequate light.



FIGURE 4. Right interior of dental trailer.



FIGURE 5. Left interior of dental trailer, showing desk, sterilizer, and supply cabinet.

The dental trailer is divided into two equal rooms. The forward half contains the dental dispensary. The dental engine is located in the right forward corner of the trailer. Originally the hand-piece was driven by a foot pedal which has now been converted to electric power by the addition of a small electric motor and rheostat. The instrument tray is mounted on an extension arm which can be adjusted to any desirable place near the dental chair. A sputum basin, with an exterior outlet to a soakage pit, is installed near the chair. The dental instruments and supplies are kept in a specially built cabinet with appropriate drawer space. The instrument sterilizer is mounted on a shelf near the instrument cabinet. The left forward corner

contains a built-in desk with writing top and sufficient storage space to accommodate all dental records (figures 4 and 5). The rear half of the dental trailer has bed space for two patients in case of emergency. Enough storage space is also available here to store all necessary auxiliary equipment during movements or when not in use.

The efficiency of these trailers has been proved during the past four months during which time they have been transported from the Netherlands East Indies to the Philippines. They have been kept in continuous service in proximity to the battalion command post during all operations.

## A Mental Hygiene Unit

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The conversion of a civilian to a soldier cannot be accomplished without definite psychiatric reverberations in the individual. This applies to the normal as well as to the chronically maladjusted person. The Guadalcanal experience<sup>1 2 3</sup> reiterates the old psychiatric principle that everyone has a psychiatric end point beyond which he cannot be pushed without developing mental symptoms. Adjustment to military life strains to the limit the faculties of stability and pliability that distinguish the mentally well from the mentally unfit, and the early training period of the soldier serves to distinguish between the more and the less susceptible. The mental hygiene principle has never been called on to answer a more challenging problem than that presented by this fact: the psychiatric casualty rate is inversely proportional to the morale factor.

The Mental Hygiene Unit in this command has developed during several months from an intramural to an extramural organization, and its original function as the psychiatric outpatient department of the hospital has been diluted by many additional responsibilities. Army needs receive primary consideration. The Unit operates in an advisory capacity and has specific functions related to the analysis, care, treatment, classification, and recommendations with respect to soldiers who demonstrate irregularity in behavior inimical to the proper function of the command.

The Mental Hygiene Unit as originally set up by Major Harry L. Freedman,<sup>4</sup> Headquarters, Eastern Signal Corps Re-

The word "unit" throughout this paper refers to the Mental Hygiene Unit.

1. Guadalcanal Neurosis, Science News Letter, p. 323, 22 May 1943.

2. Smith, E. R.: Neuroses Resulting from Combat, Am. J. Psychiat., 100:94-97, July 1943.

3. Rosner, A. A.: Psychiatric Casualties from Guadalcanal, 1. Persistent Symptoms in Three Cases, Amer. J. M. Sc., 207:770-776, June 1944.

4. Freedman, H. L.: The Unique Structure and Function of the Mental-Hygiene Unit in the Army, Mental Hygiene, 27:608-653, Oct. 1943.

placement Training Center, Fort Monmouth, New Jersey, was directly responsible to the headquarters staff of that organization. The psychiatrist who was director of the Unit was a member of the commanding general's staff, and the Unit was an independent agency directly responsible to the commanding general, functioning through the adjutant's office.

In this Army Air Forces command, the director of the Mental Hygiene Unit is a member of the general medical staff under the command of the post surgeon. The Unit at this post also operates as a liaison between the Classification Section and the post surgeon. It is directly responsible to the chief of the Neuropsychiatric Section of the station hospital and differs in several respects from those previously described.

The Unit in this command consists of a director, a personnel consultant, two psychologists, three personnel interviewers, a file clerk, a secretary to the director, and two civilian typists. The director is a psychiatrist, the personnel consultant is an officer assigned from the Classification Section of post headquarters, the two psychologists are sergeants trained in orthopsychiatric technique and mental testing, and the personnel interviewers are college graduates experienced in their field.

#### FUNCTIONS

The Unit buffers the transition from civilian to military life. The director gives a series of lectures and demonstrations to the newly arrived soldier, outlining the adjustment problems to be anticipated. Mental health from the standpoint of the soldier is reviewed, including the concept of psychosomatic disorder and the influence of the emotions in the development of body symptoms. A résumé of personality types is presented with discussions of personality deviations and their importance in military life. A short discussion explains the concept of the unconscious mind and its influence in daily life. Certain mental mechanisms are then taken up, such as rationalization, displacement, conversion, projection, and identification. The problem of fear is discussed. A lecture on morale concludes the introductory mental hygiene course. These lectures and a lecture series for officers on personnel adjustment problems follow roughly the sequence suggested in War Department Technical Bulletin TB MED 12, 22 February 1944.

The Unit serves as a psychiatric, diagnostic, and consultation service for the dispensaries on the post from where problems which arise of a presumed psychiatric nature are referred directly to the director of the Unit. The referred soldier is seen, in person, at once and a preliminary report of his psychiatric status is returned immediately to the referring medical officer. A provisional diagnosis is made by the director with recommendations for further diagnostic procedure or treatment. In many instances this initial interview is sufficient to settle the referring medical officer's immediate problem, and

the case is considered closed. If, in the opinion of the psychiatrist, the situation requires further investigation, the soldier is recommended for further processing.

The Unit is ideally set up for psychiatric investigation of referred soldiers. After a short interview with the director, the soldier, if indicated, is referred to the interviewing section for complete investigation of his psychiatric background. This entails repeated interviews by personnel interviewers, use of Red Cross facilities, correspondence with the family, church, and former employers, investigation of Army record, and consultation with commanding officer and chaplains. The soldier's mental aptitude is tested by proper psychometric examination conducted by members of the psychological staff. He is then referred to the classification officer for interview and evaluation of his classification status, and any recommendations made are entered in the record. He is then referred back to the psychiatrist.

#### PSYCHOTHERAPY

The fourth function of the Mental Hygiene Unit is treatment by standard psychiatric methods and the proper disposition of individual cases, the latter being made as quickly as possible. After consultation with the classification officer, the psychiatrist may recommend one of several courses: (1) return to duty without treatment; (2) return to duty with treatment to be given by dispensary medical officer; (3) return to duty with treatment to be carried out by director of the Mental Hygiene Unit; (4) reclassification under auspices of the reclassification officer; (5) recommendation of problem to the hospital disposition board for opinion as to disposition, particularly with respect to discharge under the provisions of AR 615-368 and AR 615-369; (6) recommendation for admission to the Psychiatric Section of the station hospital for treatment or for hospital processing for consideration of discharge under the provisions of AR 615-361. Cases referred to the Unit may come from various sources: the post Classification Section, commanding officers in various groups, medical officers at the clinics or dispensaries, medical officers at the hospital, post prison officer, chaplains, judge advocate, or the hospital disposition board.

The Mental Hygiene Unit operates as an adjunct of the Psychiatric Section of the station hospital. To reduce the length of hospital stay and the number of occupied beds, soldiers who are anticipated for admission to the psychiatric ward are investigated from a psychiatric and medical standpoint before being admitted. The form and sequence of psychiatric investigations conform as closely as possible with those used in the hospital itself. The anamnesis and mental examinations follow in detail the form used in the Psychiatric Section of the station hospital. The social service record, individual correspondence, character and conduct report, résumé

of clinical records from previous hospitals, and psychometric tests are included in these data, which are made quite comprehensive before the soldier is hospitalized. If the soldier requires immediate hospitalization because of an acute psychiatric condition, arrangements, of course, are made without delay.

Overseas neuropsychiatric casualties are processed directly through the Mental Hygiene Unit and, after psychometric evaluation of their capacity, begin a rehabilitation and training program. Certain neuropsychiatric patients who require hospitalization are first processed at the station hospital, where during convalescence they partake in a specific neuropsychiatric occupational therapy and training program given under the supervision of the Neuropsychiatric Department. In addition, the general convalescent and training program of the hospital may be used where indicated by the patient's progress in conformity with the neuropsychiatric prescription. On discharge of this soldier from the hospital, the Unit takes over his rehabilitation. The amalgamation of psychotherapy as prescribed by the hospital psychiatrist, the psychiatric prescription as carried out by the convalescent training program, and the rehabilitation program are accomplished by the Mental Hygiene Unit, following discharge. The rehabilitation of a patient is begun immediately on hospital admission, is modified with the patient's progress, and is well under way before he is discharged to the Mental Hygiene Unit.

#### CONCLUSION

In this command, the Mental Hygiene Unit has demonstrated a degree of adaptability and usefulness that exemplifies this type of organization as a sound military adjunct.



American medical wards at a hospital in Assam, India. 27 Nov. 1944.  
Signal Corps photograph.

# Vitamin C Status of Troops in the Tropics

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The principal objective in planning the Army dietary is to provide all required nutrients in adequate amounts. Evidence indicates, however, a great disparity between the amount of food served and that actually ingested. Rush<sup>1</sup> showed that in a study of food intake by a controlled group of soldiers the average daily ingestion of calcium, thiamine, riboflavin, niacin, and ascorbic acid was considerably less than the amount served and below the Recommended Daily Allowance (National Research Council).

Because of the almost complete absence of fresh fruits and vegetables from Army rations served in the tropics, attention is focused on the nutritional adequacy of vitamin C. Rush showed that in the group studied by him the average daily ingestion of vitamin C was 37 mg. as against 57 mg. served and the Recommended Daily Allowance of 75 mg. Sevringhaus<sup>2</sup> cited a study of soldiers who, although subsisting on an Army ration which, on paper, contained a liberal excess of ascorbic acid, nevertheless showed by blood and urine examinations that a significant portion of them were not in a state of vitamin C saturation.

A report<sup>3</sup> of a study of 34 soldiers showed a depletion of body reserves of vitamin C, in some instances approaching pre-scurvy levels. Similar evidence of vitamin C inadequacy was obtained in this laboratory<sup>4</sup> by determination of plasma ascorbic acid levels on soldiers coming to an Army general hospital as blood donors.

From the Chemistry Department, 19th Medical General Laboratory.

The following cooperated in this study: Col. John B. Youmans, M.C., chief, Division of Nutrition, Office of The Surgeon General, Washington 25, D. C.; Lieut. Col. Seward E. Owen, Sn. C., nutrition consultant, Office of the Chief Surgeon, Hq., USASOS, A.P.O. 707; Col. Charles S. Mudgett, M.C., surgeon, Base "G," A.P.O. 565; and Capt. Arnold G. Ware, Sn.C., nutrition officer, Base "G," A.P.O. 565.

1. Rush, Alexander: Study of Army Diet in the Tropics, Bull. U. S. Army M. Dept., 82:43-54, Nov. 1944.

2. Sevringhaus, E. L.: Adult Needs of Vitamins A and C, J.A.M.A., 126:751-752, 18 Nov. 1944.

3. Observations on Blood Plasma and Urinary Concentrations of Vitamin C Related to Dietary Intake; Report to the Chief Surgeon, USASOS, by Col. C. R. Mitchell, M.C., Office of the Surgeon, Base Section USASOS, dated 3 Feb. 1945.

4. Preliminary Vitamin C Survey; Report submitted to Col. M. C. Pincoffs, chief consultant, ADSOS, by Major A. M. Pappenheimer, Sn.C., Capt. W. Trager, Sn.C., and First Lieut. M. C. Hutchinson, Sn.C., from Headquarters, 19th Medical General Laboratory, dated 26 Feb. 1945.

In view of this evidence, a survey of the vitamin C status of troops in the tropics was undertaken at a USASOS base in Dutch New Guinea. Data are here presented from a survey of nearly 700 subjects, including male and female personnel on regular duty status and hospital patients.

#### METHODS

In this study the levels of plasma ascorbic acid have been used as a measure of the vitamin C status of the experimental subjects. It is generally accepted that recent dietary intake of vitamin C is reliably indicated by the plasma level of ascorbic acid.

Representative groups were selected on a voluntary basis at random from different types of military units. The following types of units are represented in this study: infantry headquarters company, staged; infantry regiment, staged; engineer battalion; medical sanitary companies; Medical Department personnel engaged in laboratory work; chemical warfare service units; quartermaster bakery company; WAC detachment; Army nurse personnel (general hospital); and patients in two general hospitals.

It was not feasible to obtain pre-breakfast blood specimens. Arrangements were made to take specimens at the convenience of the commanding officer of the unit concerned. The volunteers for the test were notified not to consume any canned fruits, juices, synthetic lemon juice, or vitamin pills on the day of the test. The length of service in the tropics and type of work of each subject (excluding patients) were recorded. The diagnoses and length of hospitalization prior to the vitamin C test were recorded in the case of hospital patients. Each subject was asked the following questions:

(1) Do you ordinarily consume all canned fruits and juices served in the mess? (2) Do you drink synthetic lemon juice, popularly termed "battery acid"? (3) Do you take vitamin pills? (4) Do you consistently reject any particular fruit or juice? (5) Do you show any idiosyncrasies toward any foods?

Ascorbic acid was determined on the plasma obtained from oxalated blood by the method of Mindlin and Butler,<sup>5</sup> using the Coleman Junior Spectrophotometer, Model No. 6, for photometric measurements. Proper precautions with regard to collection and processing of specimens shown to be necessary by Golden and Garfinkel<sup>6</sup> under similar circumstances were observed in this study.

As a supplement to the above studies, assays for vitamin C were performed on several common subsistence items to determine which items from local stocks were the most de-

5. Mindlin, R. L., and Butler, A. M.: The Determination of Ascorbic Acid in Plasma; Macromethod and Micromethod, *J. Biol. Chem.*, 122:673-686, Feb. 1938.

6. Golden, W. R. C., and Garfinkel, L.: Medical Evaluation of Nutritional Status; Stability of Ascorbic Acid in Whole Blood, Plasma, and Plasma Filtrates, *J. Biol. Chem.*, 144:447-452, July 1942.



pendable sources of this vitamin. These assays were made by the method of Mindlin and Butler<sup>5</sup> on specimens adequately diluted with 2.5 percent metaphosphoric acid solution. The values obtained must be regarded as minimum values since this method determines reduced ascorbic acid and not dehydro-

TABLE I  
*Plasma vitamin C levels—duty status troops*

1 Group	2 Tropical serv- ice—months	3 Total cases	4 No. cases and % of total 0-.30 mg. %	5 No. cases and % of total .31-.60 mg. %	6 No. cases and % of total over .60 mg. %	7 Mean plasma level mg. %	8 Mean plasma level		9 Labor
							Clerk- mess	—	
I. Infantry division head- quarters company—staging	13	24	3 (12%)	4 (17%)	17 (71%)	.68	—	—	—
II. Infantry regiment—staging	13	30	5 (17%)	9 (30%)	16 (53%)	.64	.79	.55	.55
III. Engineer regiment	13	30	12 (40%)	11 (37%)	7 (23%)	.41	.40	.42	.42
IV. Medical sanitary company (1)	12	45	29 (64%)	9 (20%)	7 (16%)	.33	.40	.30	.30
V. Medical sanitary company (2)	7	45	9 (20%)	12 (27%)	24 (53%)	.60	.66	.57	.57
VI. Chemical Warfare Service center	9	46	10 (22%)	15 (33%)	21 (45%)	.71	.68	.77	.77
VII. Quartermaster bakery	5	54	25 (46%)	15 (28%)	14 (26%)	.44	.32	.47	.47
VIII. Medical laboratory personnel	8	49	3 (6%)	11 (23%)	35 (71%)	.88	—	—	—
IX. General hospital laboratory personnel	12	13	3 (23%)	3 (23%)	7 (54%)	.71	—	—	—
X. WAC detachment	6	76	8 (11%)	14 (18%)	54 (71%)	.81	—	—	—
XI. General hospital nurses	14	51	6 (12%)	10 (20%)	35 (68%)	.80	—	—	—
All male personnel	—	336	99 (29%)	89 (27%)	148 (44%)	.59	—	—	—
All female personnel	—	127	14 (11%)	24 (19%)	89 (70%)	.81	—	—	—

ascorbic acid. However, no significant error is thus introduced since the reduced ascorbic acid accounts for most of the vitamin C content of the common juices. Materials were not available for the determination of dehydro-ascorbic acid.

#### DISCUSSION

The plasma vitamin C levels for all troops on a duty status are presented in table I. The average length of tropical service was not less than five months, which allows sufficient time for each group to reflect its overseas diet with respect to vitamin C intake. At least four groups (IV, V, VII, and VIII) constituted more than 40 percent of the men of their units, and group X, about 25 percent of their detachment.

The individuals of each group have been separated into three arbitrary divisions based on plasma vitamin C levels of 0 to 0.30 mg. percent, 0.31 to 0.60 mg. percent, and 0.61 mg. percent and over. "Plasma levels below 0.6 mg. indicate less than optimum dietary intakes of vitamin C, and levels below 0.4 mg. are considered by most students as definitely abnormal."<sup>7</sup> Colonel John B. Youmans, M.C., of the Nutrition Division, Surgeon General's Office, informed us there was additional experimental evidence indicating that when the plasma level drops below 0.3 mg. the level in the white cells begins to diminish. This is interpreted as indicating that tissue stores are becoming depleted at this level, which may properly be designated the pre-scurvy zone.

Accordingly, in this study the three divisions of ascorbic acid levels are designated as follows: (1) inadequate or pre-scurvy zone, 0 to 0.30 mg. percent; (2) sufficient, but without margin of safety, 0.31 to 0.60 mg. percent; (3) optimum, over 0.60 mg. percent.

In table I, under columns 4, 5, and 6, is placed the number of individuals of each group and the percent of the whole group which falls into each of the three divisions of ascorbic acid levels. In column 7 are listed the mean plasma levels of each group. Table I shows that from 29 percent to 84 percent of the individuals in the groups examined have levels below 0.6 mg. percent; that is, levels incompatible with the best nutritional standards. From column 4 it is seen that from 6 to 64 percent of the subjects of each group have levels in the so-called pre-scurvy zone. Of all the male personnel examined, 29 percent were found within this zone and only 44 percent had optimum levels. The two female groups reflect a better nutritional status with only 11 percent at the inadequate level and 70 percent at the optimum level. It is obvious that the mean plasma level of a group is not a sufficient index of the nutritional adequacy of the group. For example, although the mean plasma level for all males was 0.59 mg. percent, prac-

7. Bulletin of the National Research Council No. 109: *Inadequate Diets and Nutritional Deficiencies in the United States; Their Prevalence and Significance*. Washington: National Research Council, National Academy of Sciences, Nov. 1943.

tically an optimum level, only 44 percent of the men actually have optimum levels.

When this survey was initiated, it was observed that mess and clerical personnel within the outfits tended to have higher

levels than those who were out on labor details. It is not clear whether or not this was a reflection of the fact that mess and headquarters personnel had better access to juices than the men on labor details. However, this relationship of vitamin C level to type of activity was not borne out in the entire survey, as is shown in columns 8 and 9 of table I. The differences are hardly significant and are, in fact, reversed in groups VI and VII.

The data from the hospital patients are shown in table II. In hospital A, it was the practice to provide daily multivitamin pills containing 37 mg. of ascorbic acid, which may explain the higher levels found in this group than in hospital B and also the increase observed in those patients who had been in the hospital over ten days. There were too few cases in this hospital group to classify them according to diagnosis. In hospital B, consistently low levels were found; 59 percent were in the pre-scurvy zone and only 14 percent in the optimum zone. This group, in fact, was lower than all the other groups in the study with the exception of group IV (table I). In hospital B, with respect to diagnoses of the patients studied, only the dermatitis group was statistically large enough for separate analysis; however, they showed no significant differences in ascorbic acid level from the entire group of patients in this hospital. The explanation of the low levels for patients in this hospital is not clear, because the

TABLE II  
*Plasma vitamin C levels—hospital patients*

Group	Mean level mg. % for derma- titis cases	
	—	.27 (42 cases)
	Mean level mg. % for patients more than 10 days in hospital	
	.70 (18 cases)	.33 (61 cases)
	Mean level mg. % for patients 1-10 days in hospital	
	.45 (18 cases)	.30 (77 cases)
	Mean level in mg. % all cases	
	.57	.33
	Over .60 mg. % No. cases and % of total	
	15 (42%)	24 (14%)
	.31-.60 mg. % No. cases and % of total	
	12 (33%)	46 (27%)
	0-.30 mg. % No. cases and % of total	
	9 (25%)	101 (59%)
	Total cases	
	42	171
	General hospital A	General hospital B

rations issued to this hospital were at least the equal of, and perhaps better than, those generally issued to company messes. It is possible that the patients on admission (principally from forward areas) are mostly in a state of unsaturation and that

the diet available was sufficient merely to maintain their vitamin C levels but insufficient to effect their increase. Table II shows no significant difference between the patients who had been in the hospital up to ten days and those who had been in longer.

In table III are the results of the analysis of the juices taken from the local stocks as well as the synthetic lemon juice preparation. Attention is directed to the values obtained for the latter. The samples for analysis were taken directly from the mess as served. If this beverage were made up as directed, an 8-ounce serving would provide 30 mg. of ascorbic acid. Only one of the four preparations assayed had this content, the lowest containing only 12.5 mg. per 8-ounce portion. Rush<sup>1</sup> pointed out that it was a common mess practice to make this beverage more dilute than the directions called for because of complaints of unpalatability and gastric discomfort registered by the troops when it was made full strength.

The mean values found for the other juices are comparable with those listed in common food tables. However, note should be taken of the wide range found for the various brands of any one juice. This could result in a grossly inaccurate esti-

TABLE III  
*Vitamin C content of juices*

Juice (all canned)	No. of brands	Range of values in mg. % per 100 cc.	Mean value in mg. per 100 cc.	Mean value in mg. in 8 fluid ounces
Tomato juice	5	9.2 - 16.6	12.4	30
Orange, grapefruit, and blended citrus juices	9	16.7 - 49.0	31.2	75
Pineapple juice	3	8.3 - 13.2	10.3	25
Synthetic lemon juice ("battery acid")	4	5.2 - 12.5	8.3	20

mate of vitamin C intake if it were based on observed consumption made from standard tables.

Regarding the dietary likes and dislikes of the troops as applied to juices, about 4 percent said they drank juices very sparingly or not at all because of the resulting gastric discomfort. A like number consistently rejected tomato juice. As for the synthetic lemon juice, about 14 percent said they rejected it consistently, or drank it only rarely, because of unpalatability. Obviously, none of these items is rejected by a significantly large enough portion of the troops to warrant exclusion from the diet. It is common knowledge that the synthetic lemon juice is taken not because it is relished but because it is just another cold drink. Much can be done to enhance its palatability without sacrifice of its vitamin C content, thereby increasing its consumption by the troops.

About 8 percent of the subjects (not including hospital patients) said they were taking multivitamin capsules daily.

Inasmuch as a disproportionate number of these individuals is found in group VIII (table I), this would account for their having the highest mean level of ascorbic acid of all the groups. The number of individuals taking vitamin capsules in the remaining groups is insufficient to cause any significant alteration in observed distribution of vitamin C levels.

What is the main significance of this survey? To answer this, consideration must be given to the main objective of the Army diet, that of providing all required nutrients in adequate amounts, using as a guide the Recommended Daily Allowances (National Research Council), which are arrived at by competent authority and based on available scientific information. These allowances have been set to provide an ample margin of safety. This margin of safety is particularly important under military operational conditions. It appears, therefore, from the data obtained that with respect to vitamin C, a not inconsiderable portion of the troops have inadequate levels and about one-half of the men and one-third of the women tested do not reflect a desirable margin of safety.

What factors bring about this condition? Probably most important is the marked difference between servings and actual consumption. A second is that estimates of cooking and preparation losses are probably low, as they are based mainly on home-cooking techniques. In an army mess it is necessary to prepare meals several hours in advance of serving and keep them hot until served. Evidence is available to show that such handling results in a considerable or even complete loss of ascorbic acid. A third factor is the insufficient and improper use of the synthetic lemon juice powder.

It is believed that this dietary inadequacy could be overcome if at least 50 mg. of the recommended daily allowance of 75 mg. of ascorbic acid were provided by those subsistence items which are readily consumed and require no cooking or heating. These are canned tomato, pineapple, and citrus juices. In addition, mess personnel should be instructed in the proper preparation of synthetic lemon juice and should be urged to devise methods of enhancing its flavor. In connection with our recommendation that at least 50 mg. of ascorbic acid be provided daily in juices, attention is called to the work of Kyhos et al.,<sup>8</sup> who determined the plasma ascorbic acid levels of male prisoners subsisting on a diet containing practically no fresh fruit or vegetables. Eighty percent of the men had values of less than 0.2 mg. percent. When 25 mg. doses of ascorbic acid were administered daily, there was no significant increase in plasma values. When 50 mg. doses were given, the plasma values rose but did not reach optimum levels until 75 to 100 mg. doses were given.

Does the data presented here suggest a greater require-

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8. Kyhos, E. D., Gordon, E. S., Kimble, M. S., and Sevringhaus, E. L.: The Minimum Ascorbic Acid Need of Adults, *J. Nutrit.*, 27:271-285, 10 Mar. 1944.

ment of ascorbic acid in the tropics than in the temperate zone? In view of the evidence available we do not think an affirmative answer is justified. While it has been suggested that profuse sweating might cause significant loss of ascorbic acid, the studies of Kirch et al.<sup>9</sup> and Tennent and Silber<sup>10</sup> show that the amount of ascorbic acid in sweat is negligible with respect to nutritional considerations.

Why is there so much difference between the various groups (compare groups IV and X), since all of these organizations draw rations from the same subsistence stocks? The survey was conducted over a two-month period (March to April 1945) and as far as we can determine, no radical change in subsistence issue occurred during this period. An adequate answer cannot be offered at this time, although variability in the standards of mess management may be a potent factor. In view of the low values found for hospital patients, it seems advisable to supplement their regular diet with ascorbic acid tablets.

#### CONCLUSIONS

Of the vitamin C levels in the men tested, 56 percent were below 0.6 mg. percent and 29 percent below 0.3 mg. percent. Of the women, 30 percent were below 0.6 mg. percent and 11 percent below 0.3 mg. percent. In hospital patients examined in the same manner, generally lower levels were found than in the other troops. These results are interpreted to indicate that a degree of nutritional inadequacy with respect to vitamin C exists in troops subsisting on overseas rations without fresh fruits and vegetables. To overcome this inadequacy, at least 50 mg. of the recommended daily allowance of ascorbic acid should be provided by canned juices.

9. Kirch, E. R., Cornbleet, T., and Bergeim, O.: Ascorbic Acid in Sweat, *Proc. Soc. Exp. Biol.*, N.Y., 54:307-308, Dec. 1943.

10. Tennent, D. M., and Silber, R. H.: The Excretion of Ascorbic Acid, Thiamine, Riboflavin, and Pantothenic Acid in Sweat, *J. Biol. Chem.*, 148:359-364, May 1943.



Members of engineer unit paint red cross on hospital tents for general hospitals in Cherbourg area. 1944. Signal Corps photograph.

# The Army Institute of Pathology

COLONEL J. E. ASH

Medical Corps, United States Army

The Army Medical Museum was established in 1862 by Surgeon General Hammond to collect examples of wounds and injuries incident to war, that they might be available to teach Army surgeons in times of peace. The original purpose persists, but through the years activities have expanded to the point where the connotation "Museum" has led to misunderstanding of the institution's activities. The Surgeon General recently permitted the adoption of the term Army Institute of Pathology for the pathologic activities of the Museum and granted the commanding officer the title, "director," as a substitute for "curator." The Museum *per se* is the least significant part of the organization. Although an instructive exhibit is still open to the public, at least 50 percent of the material formerly on display has been packed away to make room for expanding laboratories and offices.

The modern era of the Institute dates from 1920. The Museum had been used in a desultory way by the Army as a consulting laboratory and during World War I many autopsy records were filed there. Army Regulations of 1922 required that material and records from all autopsies performed by, or on, military personnel be submitted to the Museum, and later the Regulations were amplified to cover significant surgical material including all tumors. These directives have met with increasing compliance on the part of Army pathologists, especially since the onset of the present war. As a result, the trickle of material of a decade ago has swollen to a torrent, averaging the records and tissues from fifty autopsies a day and a greater number of selected surgical specimens to be studied and processed. The Institute is now, indeed, the central laboratory for Army pathology, and incidentally, the U. S. Army is the only armed force in the world with such an arrangement. In 1922 the Registry of Ophthalmic Pathology at the Army Medical Museum began to operate and bring together in one central laboratory the records and tissue from various diseases of the eye, where they are now available to investigators pursuing definitive studies in the field of ophthalmic pathology. Since then thirteen other registries have been established by representative national societies, and these constitute the American Registry of Pathology sponsored by the National Research Council. Practically every special

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Condensation of the Tenth Annual Harrison S. Martland Lecture delivered before the Essex County Anatomical and Pathological Society, Newark, N. J.



field is covered, including comparative pathology sponsored by the American Veterinary Medical Association and gerontology most recently added by the Committee for the Study of the Aged. The registries assure the Institute of a steady flow of material in the special fields coming from the civilian profession, in addition to the enormous amount from Army hospitals. They also furnish the Army with an unexcelled consultation service in all fields of pathology.

At present a comprehensive study of all the diseases which are prevalent in the military age group (18 to 38 years), whether related to or distinct from military service, is one of the main functions of the Army Institute of Pathology. Never before has there been an opportunity to learn so much about the pathology of this military age group; only now as a result of the Army policy of centralization have significant data been available to cover this presumably healthy span. Our figures can be no more than suggestive, because there is a fairly effective screening of personnel before acceptance for military service, nor can they show actual incidence of disease because they represent mostly fatalities. They may be said, therefore, to indicate possibilities but greatly to understate incidence, which is more accurately reflected in the results of the induction examinations, at least in regard to the more obvious conditions, such as eye defects, psychoses, deformities, and tuberculosis. Material coming to the Army Institute of Pathology is more likely to be from diseases likely to be missed on the necessarily limited induction examination.

It has long been known that fatal coronary disease occurs in the young, but the relatively large number of cases in our records is surprising. An analysis of the first eighty cases received shows that one-third of the deaths were in men under 30 years of age. Overweight, if not actual obesity, was a common condition. The commonest prodromal symptom was chest pain which occurred in 30 cases. About one-half of the patients died suddenly; twenty-four had painful seizures of a few minutes' duration and only six lived for more than a few hours. As a rule there was no significant hypertrophy of the heart, but in about half the cases there were scars of previous dam-

TABLE I  
*Representative diseases in the  
18 to 38 age group*  
(January 1940 to 1 January 1945)

Fatal coronary disease .....	422
Periarteritis nodosa .....	93
Fatal diabetes .....	45
Aneurysm, brain .....	102
Boeck's sarcoid .....	210
Carcinoma, lip .....	305
Carcinoma, G.I. tract—(stomach, 40) ..	278
Tumors, testis .....	428
Tumors, brain (medulloblastoma, 33) ..	221
(glioblastoma multiforme, 67)	
Tumors, bone (osteogenic sarcoma, 78) ..	289
(Ewing's tumor, 30)	
Tumors, lung (adenoma, 28) .....	77
Tumors, lymphatic (Hodgkin's disease, 312) .....	730
(giant follicular lymphoma, 41) (leukemias, 206)	

age and usually great narrowing of the descending branch of the left coronary artery by atheroma.

Periarteritis nodosa has been considered a comparatively rare disease. The majority of the cases in this series were collected during mobilization and the earlier months of the war. For some reason the incidence has declined more recently.

The number of malignancies in the intestinal tract in men in their twenties is unexpectedly large and the preponderance of intestinal tumors over those of the stomach is striking. In the case of carcinoma of the lip, military service might be a contributing factor, since so much of the training was in the South, where the men were exposed to such factors as sun, wind, and irritating dust.

The high figure for testicular tumor is not surprising in this age group. Its importance lies in the fact that much can be learned from the study of so many cases, especially since accurate clinical and therapeutic data are available in the majority. It would seem that the notion that glioblastoma multiforme is a tumor of middle age is ill-founded. Astrocytoma and medulloblastoma are also more frequent in comparative youth than has been believed. Adenomas of the lung constitute more than one-third of the chest tumors, and the study of this relatively large group will ultimately throw some light on this important tumor.

Much that is not known about giant follicular lymphoma (the Brill-Symmer's syndrome) might be revealed by follow-up study of the cases which we recently have had a greater opportunity to observe in the early stages of the disease.

In addition to those listed, a number of less usual but equally interesting conditions have been noted. Fifteen adenomatoid tumors of the genital tract have recently been

TABLE II  
*Representative conditions incident to military service*

Epidemic hepatitis—(subacute, 152) ...	296
(acute fulminant, 144)	
Hemoglobinuric nephrosis .....	360
Waterhouse-Friderichsen syndrome ...	87
Heat stroke .....	213
Cold injuries—(high altitude, trench foot) .....	40
Broken necks .....	188

reported. Melanoma of the choroid is a disease of advanced years; only an occasional case among the 2,000 that have accumulated in the Registry were in younger people. In the routine examination of the great number of enucleated eyes received recently, a

significant number of early melanomas have been found, not yet recognizable clinically. These cases will help in the study of the pathogenesis of these tumors. About 400 cases of gynecomastia furnish ample material for a study just completed.

We have been comparatively fortunate in this war in the absence of violent epidemics, such as those of measles and influenza in World War I. Meningitis has been one of the most

troublesome of the contagious diseases, especially as it has been complicated by an unusual number of the fulminant meningococcemias, which kill in a matter of hours, frequently before the infection is suspected. Eighty-seven autopsies show the classic Waterhouse-Friderichsen syndrome with its fatal involvement of the adrenals.

Much of the training of troops has been carried on in the South and in the desert, and much of the campaigning has taken place in tropical climates; therefore, the effects of heat have been of great importance. Heat stroke, the most serious of these, often results in death and the material from 213 autopsies is being intensively studied by our neuropathologists, collaborating with physiologists and clinicians.

Frostbite, resulting from high altitude flying, battle conditions in cold, wet environments like Attu and the Italian mountains, or from immersion or continued exposure to wet cold while adrift, has led to much disability. More adequate protection and better discipline have improved the situation. The mortality has been very low; the number given in table II (i.e., 40) simply represents the number of cases from which material has been received. While much of this has shown the terminal stage of gangrene, other specimens have presented practically every stage of frostbite, as they have come from cases in which death was due to other causes.

The 188 cases of broken neck represent only those in which the patient lived for a time after injury—in this series, for an average of seventy-two hours. Eighty percent of the fractures were incurred in diving accidents with varying degrees of damage to the cervical cord. Analysis of the clinical features in relation to the anatomic damage will give information about the physiology of the autonomic nervous system.

Early in 1942 jaundice appeared in epidemic form in several areas of this country. The study made of this disease at the Army Institute of Pathology was one of the early justifications of the policy of centralization of pathology in the Army. The subterranean rumors that the Army was infecting its men with yellow fever in the process of immunizing them against the disease were refuted by the first few autopsies, which proved that the condition was catarrhal jaundice in epidemic form that has afflicted armies through the ages. The description of the disease published during the Civil War by Woodward, who was then on duty at the Army Medical Museum, is still accurate. There were similar epidemics in several of the armies during World War I. The epidemic subsided in the United States in the summer of 1942, but there are still a few scattered cases. Recently hepatitis has broken out in epidemic proportions in certain foreign theaters. The picture has changed, however; the disease is much more fulminant. In the earlier epidemic only one or two patients died as early as

ten days after onset; usually from thirty to fifty days elapsed. In the recent series death occurs from one to nine days after onset in over half of the cases. The entire subject is now being studied in the light of the new experience and with the cooperation of theater pathologists.

The English first called our attention to a syndrome which followed crushing injuries to large muscle masses, particularly of the extremities. After initial shock, patients appeared convalescent for four or five days, then oliguria and anuria were followed by uremia and death. The striking feature histologically was the involvement of the distal portion of the nephron—that is, the distal convoluted tubule and the ascending loop of Henle. These were plugged with hemoglobin casts, the epithelium necrotic, and the damaged tubules surrounded by inflammatory reaction. There was frequently phlebitis of the neighboring veins. The English called the syndrome crush kidney. Soon we began to see the same picture as a result of burns, accidents from whole blood transfusions, sulfonamide poisoning, and other causes. Material exchanged between the Army Institute of Pathology and Dr. Bywaters in England made it evident that the lesions were identical. The condition which we now call hemoglobinuric nephrosis or lower nephron nephrosis is one of the comparatively new syndromes to be recognized as a result of experience in the present war.

#### PHOTOGRAPHIC DEPARTMENT

The Photographic Department was established in 1863 by Joseph Woodward, a pioneer in photomicrography. It has expanded tremendously during this war, particularly through the organization of the Medical Museum and Arts Service. There was little formal facility for clinical photography and medical art in the last war. The late Colonel Louis B. Wilson recognized the importance of such a service and his recommendations were followed to lay the foundation of the photographic and arts service developed in this war. Early in 1942, efforts were made to bring to the Army Medical Museum the professional clinical photographers and medical artists as they were drafted, as well as those who could be persuaded to enlist. Standard equipment was developed with the cooperation of the Signal Corps, and units consisting of one officer and six enlisted men were organized and trained. The 1st Unit went to the China-Burma-India Theater in January 1943. Eight additional units have gone to other theaters. These units are equipped to take still and moving pictures in black and white and color under practically any condition found in the theaters of operations. Each has a medical artist prepared to sketch in the operating or autopsy room, or to make charts and diagrams and to illustrate reports and special studies. More recently, some sixty general hospitals in this country have been

equipped for clinical photography. From these sources illustrative material is flowing into our Photographic Department at the rate of over 4,000 black-and-white prints, several hundred Kodachromes, and several hundred feet of movies a month. Material is available to everybody, and it will be processed and preserved for posterity. We have in the files over 60,000 black-and-white prints, over 5,000 Kodachromes, and about 50,000 feet of movies, covering every phase of Medical Department activity.

#### THE PRESENT AND FUTURE USES OF THIS MATERIAL

1. *Military application.* It is the central source of pathologic data particularly for patients that are transferred from hospital to hospital or from overseas to the zone of the interior. It is used in determining line of duty status and in correcting diagnoses for final statistical purposes. It is used in the preparation of "study batches" of slides and accompanying syllabuses for pathologists in Army installations, to acquaint them with the current problems. It furnishes illustrative material for Medical Department training programs, lectures, and scientific papers.

2. The material has served as the basis for definitive studies that have immediate application or are of general scientific import.

3. The volume on pathology of the medical history of this war is being prepared by the staff of the Army Institute of Pathology.

4. *General applications.* All the material of the Army Institute of Pathology will be available not only to the military but to the civilian profession for historic, scientific, and teaching purposes. It will be used in the program of postgraduate training through fellowships in general pathology or as part of the training in the various specialties. The American Dental Association has already established a fellowship in Dental and Oral Pathology at the Institute and other representative special groups will do the same. It furnishes material helpful in teaching special subjects; we have already sent to the medical schools of the United States and Canada a comprehensive collection of tissue and lantern slides on tropical medicine, and we have just completed an additional collection of 110 colored lantern slides covering the clinical and pathologic aspects of tropical diseases for the use of medical schools. It is made available on a loan basis for study in general and special pathology. Our sets are used extensively by candidates preparing for the various special Board examinations.

The hope of the Institute staff is to salvage from this holocaust as much as possible and thereby make some amends for the terrible sacrifices this war has demanded.

## SKIN SENSITIVITY DUE TO ATABRINE

MAJOR RICHARD WHITEHILL

Medical Corps, Army of the United States

Atabrine is being used extensively by the armed forces and is being handled by large numbers of soldiers, nurses, and doctors. As the successful therapy of contact eczema depends on the recognition and elimination of the offending substance, it is considered worth while to report that atabrine may act as such an agent.

### Case Report

An Army nurse, 26 years of age, was admitted to the hospital on 6 November 1943 because of an itching rash of the eyelids. Her family was negative for allergic or skin diseases. Her past health had been excellent. The tonsils and adenoids had been removed when she was three years of age. She had occasional contact with atabrine in 1939, 1940, and 1941, and had frequent daily contacts with the drug since October 1942. The present illness began about three and one-half weeks before admission, with a small, rough, scaly lesion on the lids of the right eye. In another day the same type of rash appeared on the lids of the left eye, and in a few more days a small patch appeared behind the right ear. The lesions slowly enlarged. Itching became severe and interfered with sleep. During several months before the present illness she had used new face cream, bath powder, perfume, and had employed hair tonic in the treatment of dandruff. Since October 1942 she had been working on general medical wards, coming in contact with the usual drugs, and had handled atabrine tablets several times almost every day during that period.

The physical examination was negative except for the skin. Both upper and lower eyelids were completely involved by a scaly, thickened, erythematous eruption. The bulbar and palpebral conjunctivae were moderately injected. Behind the right ear was a similar plaque about the size of a 25-cent piece. Elsewhere the skin was normal. The differential white blood cell count showed 6 percent eosinophils. The patient was seen in consultation by Major Harry Robinson who made a diagnosis of a contact type of dermatitis. Treatment with compresses with Burow's solution in a 1 to 20 dilution brought about clearing of the skin in two weeks.

Patch tests were carried out with some twenty cosmetics and other substances with which the patient came in contact, and all were negative except hair tonic (1 plus) and Lux soap (plus or minus). The reaction to the hair tonic consisted of a slight erythema with a few pin-point vesicles, and was considered of questionable significance. Tests with the constituents of the hair tonic—castor oil, bichloride of mercury (1:1,000), resorcinol, medicated alcohol (70 percent)—were all negative. The patient was discharged from the hospital on 19 November with the instruction to avoid the hair tonic and bichloride of mercury. She returned to her duties on a medical ward. By 24 November her eyelids began to itch and to become red. Tiny vesicles were visible over an erythematous base. The recrudescence shortly after the patient returned to ward work suggested contact sensitivity to some drug and patch tests were performed with a number of them. These tests were all negative except the one with atabrine which was 3 plus and was characterized by erythema and numerous fine vesicles. The site of the atabrine test began to itch within twelve hours and continued to

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do so at times for a month. It gradually faded but did not disappear until a sunburn in early January 1944 caused it to peel. The skin of the eyelids became normal two weeks after the flare-up. The nurse was transferred to a surgical ward, and she has been perfectly well since she learned to avoid contact with this drug.

#### Comment

In this case it is obvious that there was no marked sensitivity to atabrine until contact had been repeated many times, and that the skin of the eyelids was much more sensitive than that of the hands. Atabrine was synthesized on the basis of the antimalarial action of plasmochin, and the latter was made because of experience with methylene blue as an anti-plasmodial agent. The structural formulas of atabrine and plasmochin are somewhat similar. Because of this chemical similarity, patch tests were performed on 28 February 1944 with plasmochin, methylene blue, and picric acid. They were completely negative. This illustrates the specificity of the skin sensitivity. The case also emphasizes that a careful history and patient search are often necessary before the substance responsible for the dermatitis is discovered. Contact eczema due to atabrine must be infrequent. Of the thousands of tablets of the drug dispensed in the hospitals on this island, this is the only occurrence of skin sensitivity to it known to the author. Nevertheless, it can occur and such a possibility must be kept in mind.

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### DERMATITIS FROM ATABRINE

MAJOR L. M. NELSON

Medical Corps, Army of the United States

Atabrine dihydrochloride (mepacrine hydrochloride, B. P., quinacrine hydrochloride, U. S. P.) is widely used in the suppressive treatment of malaria. Since cutaneous reactions to the drug other than a yellow discoloration of the skin are rare, the following cases, observed while on duty at an Army hospital in Italy, are reported:

CASE 1. A white American soldier first noted, about two weeks after starting to take atabrine during the summer of 1943, that he developed a pruritic dermatitis of the wrists, which spread to involve "spots" over the entire body where the "skin peeled off and was purple underneath." He was treated as an ambulant patient during the summer and continued to do his duties. The dermatitis cleared in the fall when he stopped taking atabrine, and he remained free of any eruption until 5 May 1944, when the eruption recurred on the flexor surfaces of the wrists and the thenar and hypothenar eminences. He had resumed taking atabrine on 24 April 1944. When first seen by me on the following 8 May, he presented violaceous, macular lesions about 5 mm. in diameter over the flexor surfaces of the wrists and the proximal half of the palms. The palms and the flexor surfaces of the wrists were bronze in color. He discontinued taking atabrine, and the pruritus disappeared in three days. When seen on 2 June, the areas of dermatitis were peeling and the bronze pigmentation had disappeared. He had been taking suppressive doses of quinine without reaction. He was asked to resume taking atabrine, 0.1 gm. daily, and apply a patch test of powdered atabrine as soon as the pruritus reappeared. He took atabrine on 2, 3, and 4 June, the pruritus reappearing

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Submitted to The Surgeon General's Office on 3 July 1944 while the author was on duty in the Mediterranean Theater. For security reasons it could not be released until this time. See article on "Evaluation of Untoward Reactions Attributable to Atabrine" in this issue of The Bulletin for additional information on this syndrome.



on 4 June. The next day he applied the patch test to his right forearm and reported to the dispensary on 7 June, at which time the area of the patch test showed no reaction. The palms and flexor surfaces of the wrists were erythematous and a few violaceous macular lesions 0.5 to 1.0 cm. in diameter were present on the flexor surfaces of the wrists.

**CASE 2.** A 37-year-old white American soldier states that he took atabrine throughout the summer and until 15 October 1943, except for a short period early in September. He developed a dermatitis of the left ankle and right wrist during the last week of September, for which he was treated with sulfadiazine ointment. The eruption spread to the eyes and ears. He was hospitalized on 15 October 1943. The dermatitis became universal, bullae developed on the arms and legs, and he eventually developed a generalized exfoliation. He lost part of his hair and developed deep transverse depressions of the fingernails. He made a slow recovery under treatment consisting of blood transfusions, plasma transfusions, baths, and local applications. He was discharged from the hospital on 5 February 1944. There were minor local exacerbations of the dermatitis between February and April, 1944, for which he applied a crude coal tar ointment. He had no medication by mouth other than some vitamin globules until 14 April 1944, when he again started to take atabrine for the suppressive treatment of malaria. On 17 April, he noted that his eyes and ears were swollen. He was hospitalized. When first seen by me at the time of his second hospitalization, physical examination showed a general erythema superimposed on a universal pigmentation. There was an exudative dermatitis of the groin, genitalia, popliteal and cubital spaces, and the ears. Edema of the face, particularly of the eyelids, was marked. There were follicular vesicles of the arms and thighs and vesiculopapules of the rest of the body.

**Laboratory.** Routine blood count and urinalysis were negative. Patch test of powdered atabrine was negative at forty-eight hours but showed a papulovesicular reaction at sixty hours. Patch test with 5 percent sulfathiazole in a base of equal parts of lanolin and petrolatum showed a vesicular reaction at forty-eight hours, while patch test with powdered quinine was negative at forty-eight hours.

**Course.** Aside from a mild hyperpyrexia during the first five days, the course was uneventful. He developed a mild generalized exfoliation which responded to local medication, but areas of exudation occurred at intervals. The pigmentation persisted, and he developed depressed transverse lines at the lacunae of the nails.

#### Comment

The dosage of atabrine administered to members of the United States Army in this area for the suppressive treatment of malaria during the summer of 1943 was 0.4 gm. weekly. Early in the summer, it was given as divided doses of 0.2 gm. twice weekly; later, it was given in 0.1 gm. doses on four days of the week. At present (June 1944) the dosage is 0.1 gm. daily.

The literature for a complete review of the subject is not available. Beckman<sup>1</sup> cites a case of dermatitis which was presumably but not certainly due to atabrine. In May 1942, Noojin and Callaway<sup>2</sup> reported a case of exfoliative dermatitis due to atabrine. Other cases of dermatitis have no doubt occurred. During the summer of 1943, I observed a medical officer who developed, when taking the drug, urticarial lesions topped with

1. Beckman, Harry: Treatment in General Practice, 4th ed., p. 97. Philadelphia: W. B. Saunders Company, 1942.

2. Noojin, R. O., and Callaway, J. L.: Generalized Exfoliative Erythroderma Following Atabrine, North Carolina M. J., 3: 239-240, May 1942.

vesicles. These lesions subsided when the drug was discontinued, only to recur when the drug was resumed. Unfortunately, this patient's medical record is not available.

The positive reaction obtained by the patch testing of case 2 with powdered atabrine is presumed to be a manifestation of hypersensitivity rather than of a primary irritant since eight patients with other dermatoses tested in the same manner did not react.

## TEMPORARY ACRYLIC OCULAR PROSTHESES

MAJOR MAX KUCHARICH

Dental Corps, Army of the United States

The problem of making temporary acrylic ocular prostheses to use following enucleation to maintain soft tissue position was presented to our dental clinic. Such prostheses are usually made from individual wax models at the time required, and, since the need of a large number was anticipated, this was not considered feasible. A more practical method of constructing these from clear methyl methacrylate has been developed and has proved effective for the past two years, during which time about

one hundred have been inserted by our Department of Ophthalmology. The advantage of this method is that a large supply of various sizes can be furnished and maintained with little effort. This is accomplished by constructing a permanent metal mold which incorporates one of each of the various sizes required and which is not destroyed during the curing process.

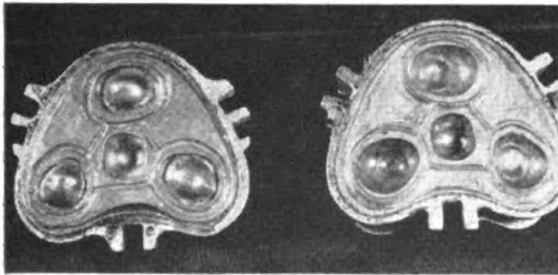


FIGURE 1

Three sizes of prostheses have been found suitable for most cases encountered. This service can easily be rendered by any dental laboratory since the materials used and the processing are, with minor variations, the same as those used in denture construction.

Figure 1 illustrates the permanent, type-metal mold using a No. 7 Whitney flask. The technique of construction is as follows: (1) A hole about 1 in. in diameter is drilled in both upper and lower surfaces of the flask. These holes are beveled outward, for reasons explained later. (2) Wax master models of the various sizes are procured. These are partly embedded in plaster in the lower half of the flask, care being taken to eliminate all undercuts. (3) The upper half of the flask is placed in position, filled with hydrocolloid impression material (diluted with water, 50 percent), and chilled. (4) The flask is separated. Cristobalite investment is poured over the impression surface of the hydro-

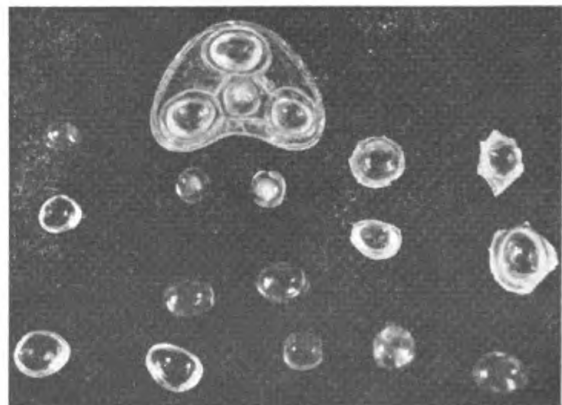


FIGURE 2

colloid material which remains in the upper half of the flask. This investment should be approximately  $\frac{1}{2}$  in. thick with slight excess over the edge of the flask to ensure a good seal. (5) When the Cristobalite investment has set, separate carefully from that half of the flask. Remove the hydrocolloid material and replace the investment in the original position. (6) The investment with this half of the flask in position is heated over a hot plate to dispel all moisture. (7) Molten type metal is poured through the drilled opening, permitting an excess above the surface. This is later filed flush with the surface, the bevel of the opening locking the metal in place. (8) The upper half of the flask is now completed. The original wax models are carefully removed from the plaster in the lower half of the flask and placed in their proper positions in the completed upper half of the flask. The plaster is removed from the lower half of the flask, which is now placed over the upper half of the flask. The entire flask is now in an inverted position. (9) For the completion of the remaining half of the flask, repeat steps 3 to 7.

Figure 2 illustrates the cured acrylic "wafer" as removed from the flask, also individual prostheses before and after polishing.

If due care is taken in the steps outlined, the metal mold will be smooth and accurate in detail with no porosity or voids. The type metal should be poured at the lowest possible temperature. This metal, which is a low-fusing alloy of bismuth, lead, and tin as the main constituents, displays a fair amount of hardness and with normal usage will last indefinitely. Tin-foiling of the surfaces prior to packing is advised, although not necessary. The curing of the methyl methacrylate should begin with the flask in cold water, heated slowly to boiling temperature. This should consume from one to two hours to eliminate internal porosity.

#### DIRECT DUPLICATION OF ROENTGENOGRAMS BY ARTIFICIAL SOLARIZATION

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To duplicate a roentgenogram, ordinarily a positive is obtained from the original negative and then a duplicate negative is made from the positive. This method of duplication can be accomplished either by x-ray or by white light. To obtain a negative directly from a negative without any intermediary step, the principle of solarization is used. Solarization is the process of reversal of image obtained by exposure to artificial white light over a comparatively long period of time.

##### Technique

The unexposed film is first fogged by exposing it for two to three seconds to white light on a standard Keleket viewing box, which has been set horizontally. The film is then superimposed on the original negative and a cardboard is set on top. These are covered by a flat weight, as a cassette, to allow even distribution of pressure; otherwise, gray pressure streaks will show up on the solarized negative. The viewing box lights are then turned on for twenty-five to thirty minutes. The newly exposed film now shows the image. The film is then developed, fixed, and washed similarly to other films, except that it can be processed either in the light or in the dark.

This technique is used when the original film is of good black-and-white contrast. The pre-exposure fogging is essential to obtain the proper tonal qualities of black and white on the solarized duplicate. If no pre-exposure fogging is used, the whole solarized duplicate will be gray and considerable detail is lost. On the other hand, if the original negative to be used for copy is too dark from x-ray overexposure, then, to obtain a

solarized duplicate of good black-and-white contrast, the unexposed film is not fogged prior to exposure to white light. Also, the exposure time is relatively short, only three to eight minutes, depending on the degree of overexposure of the original film. The solarized duplicate thereby obtained will not appear overexposed as the original, but will show good detailed and tonal quality, provided the film is developed in white light; otherwise, the film will be gray. The total time of developing is about five to six minutes, developing temperature being 65° to 68° F. During this period, the film is frequently lifted out of the solution, thereby exposing it alternately to developer solution and white light. If, in duplicating an overexposed original negative, the unexposed film is fogged prior to exposure to white light, the solarized duplicate will show loss of contrast and detail and will appear dirty gray.

#### Experimental Data

Separate films were developed after exposure to a flash of white light, and after exposure to light at one, three, five, ten, and fifteen seconds. Exposures were also made at one, five, ten, and fifteen minutes. The flash exposure showed the positive image, i.e., a substitute for black and white and vice versa. The three-second exposure showed beginning reversal image—i.e., black for black and white for white—and as the time of exposure lengthened, more and more of the image appeared in the original color. This reversal of image first became evident in the areas of greatest bone density, the least dense areas being the last to show this reversal effect.

Solarized films which have been exposed to white light less than fifteen minutes must be developed in white light; otherwise, they appear gray. Paradoxical as it may seem, in view of this method of developing films in white light, which have been solarized less than fifteen minutes, if the original negative is removed from contact with the solarized film at the end of the exposure time and the undeveloped solarized film is now further exposed alone to white light, the image thereon fades away and eventually disappears entirely.

Solarized films which have been exposed to white light over fifteen minutes can be developed either in the white light or in the dark. The degree of response of the silver salt emulsion to increasing light exposure is variable. The density of silver salt deposit at first increases slowly with exposure, then more rapidly, and then less rapidly again.

Evidently this "saturation point" is reached in about fifteen minutes, and probably bears some relation to the fact that films solarized less than fifteen minutes must be developed in white light; whereas, others exposed over fifteen minutes can be developed either in white light or in the dark.

#### Summary

Duplicates of original films of good contrast are obtained, first by fogging the unexposed film, and then solarizing it for twenty-five to thirty minutes in contact with the original film. Developing can be done in white light or in the dark. Overexposed original films can be duplicated in better detail and contrast by solarizing an unfogged film for three to eight minutes in contact with the original film. Developing is accomplished in white light. On the solarized duplicate the reversal of image begins to occur in about three seconds after exposure begins. All films solarized less than fifteen minutes should be developed in white light. The direct duplication of a negative by sunlight has been accomplished previously. However, one can readily see that, because of uncontrollable factors, results by this method are protean. By the use of controlled artificial solarization, reproduction can be standardized.

## SIMPLE METHOD OF TOMOGRAPHY WITH THE STANDARD ARMY FIELD X-RAY UNIT

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A simple attachment for performing tomography with the standard Army field x-ray unit, using a single table unit, has been devised. In a previous report<sup>1</sup> on an adaptation of this apparatus for laminography, two field tables were used, one mounted on the other. This arrangement proved impractical in the overseas tent hospital x-ray department because of the difficulty in obtaining the required accessories and because of the time necessary to disassemble and reassemble the apparatus. A simple apparatus,

which could be assembled rapidly and easily attached to a completely set-up field table x-ray unit and not involving any rearrangement of equipment in the department, was required. Such an apparatus was constructed of seven pieces of wood secured from crates in which x-ray equipment was shipped. Five nuts and bolts and a few nails complete the accessories required. The illustrations show the method of construction and application of these accessories (figures 1 and 2).

The upper crank handle of the tube column is used to move the tube during the exposure. The pressure of the arm imparts a proportional motion in the opposite direction to the entire tube and film carriage through the wooden lever which pivots at a predetermined level at a fixed point. An upright board, firmly attached to a plywood table top and drilled with holes

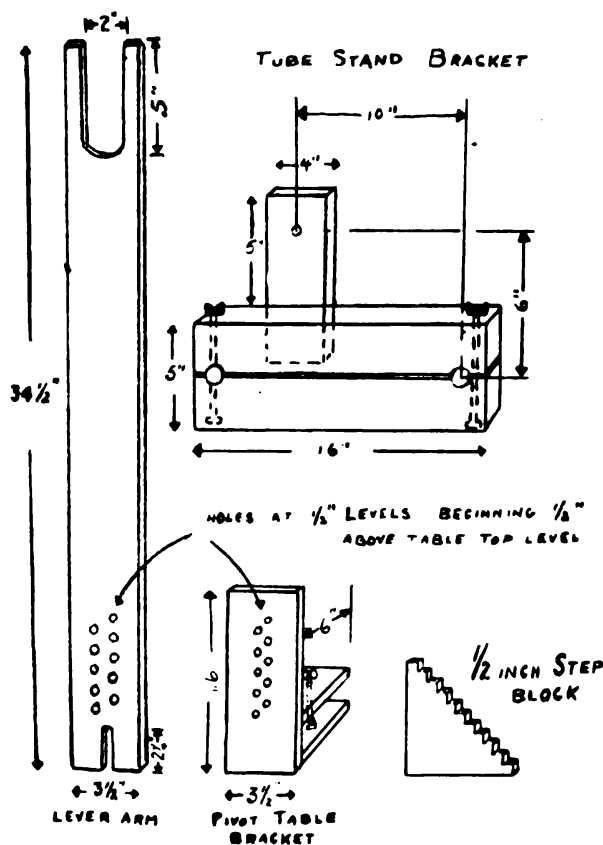


FIGURE 1. Scale drawing of tomographic wooden parts partially assembled.

at  $\frac{1}{2}$ -inch levels from  $\frac{1}{2}$  inch to 5 inches above the table top, provides the fixed pivot point. The point where motion is transmitted to the film and tube carriage is located at the level of the film and consists of a bolt in a wooden upright clamped to the two movable transverse tubular metal supports for the tube stand. These supports are locked in such a position that

1. Friedman, M. M., and Eberhardt, J. W.: Adaptation of Standard Field X-ray Units for Laminography, Bull. U. S. Army M. Dept., 73:104-106, Feb. 1944.

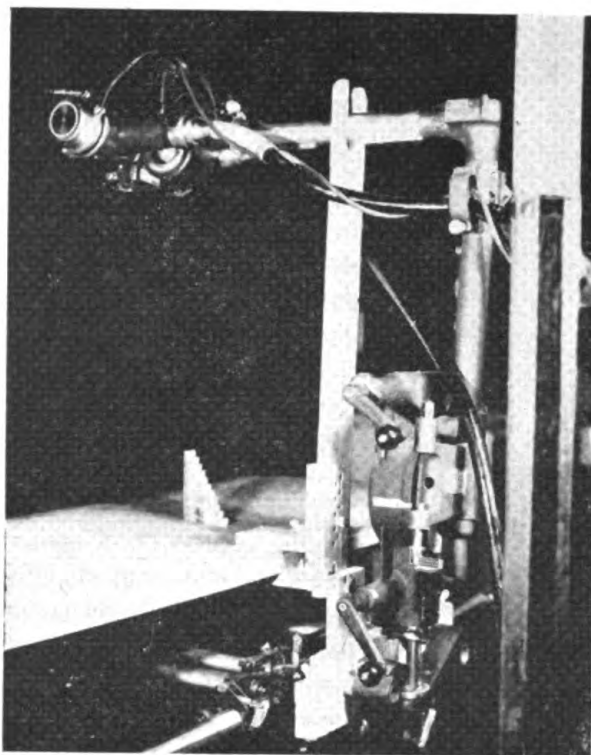


FIGURE 2. Tomograph attached to plywood table top. Note step-block on table.

displacing the tube toward one end of the table and the tube stand and cassette carrier toward the other end. The patient is then instructed to hold his breath and remain still. The crank handle is then turned in such a direction as to move the tube toward the other end of the table through the vertical position and the exposure is started simultaneously. The crank handle is given one turn per second, which can be accurately judged with a little practice by watching the timer pointer during the exposure. If shorter exposure times are desired, two crank turns per second are feasible. Assuming an exposure time of ten seconds, the crank handle is given ten complete turns, which brings the tube five turns beyond the vertical position.

Experience has shown that the motion imparted to the tube and film by ten crank turns results in a fairly thin layer in sharp focus. If it is

the tube is centered over the film on the film carrier. The tomographic accessories can be clamped and attached to the fully assembled x-ray unit in about two minutes and require no further assembly, alteration, or disassembly of the x-ray table unit. It must be noted, however, that the fluoroscopic shutter assembly has been removed from the tube arm on this table, which is used only for radiography.

Operation of the apparatus by one person wearing a lead apron is practical. Exposures can be made varying from six to ten seconds, usually the latter. The cassette, and grid if desired, are centered to the tube with the tube arm in the vertical position and with the patient in place. The bolt is placed in the pivot hole at the selected level. The upper crank is then given five complete turns,

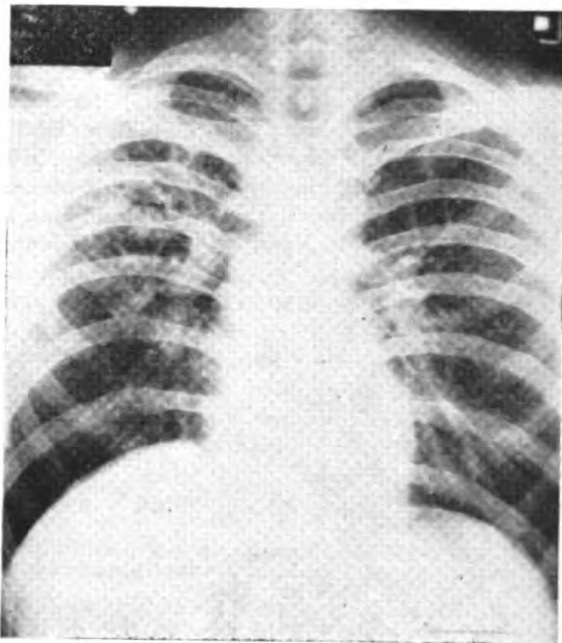


FIGURE 3. Standard PA view of chest revealing fibrocaseous tuberculosis of the right upper lobe with one definite peripheral sub-clavicular cavity.



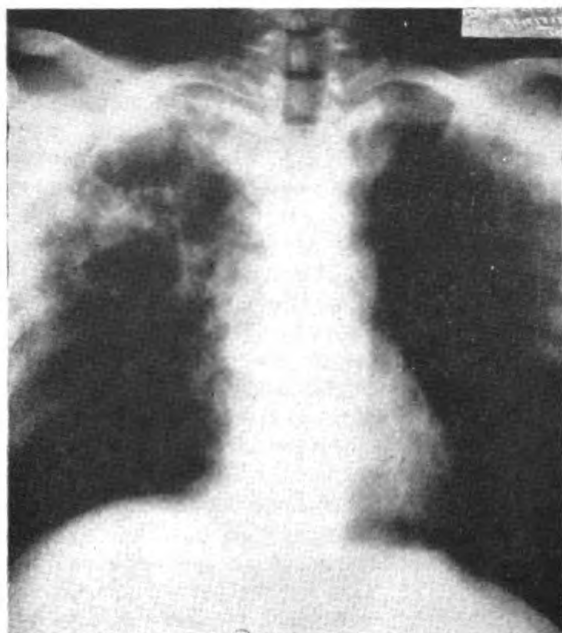


FIGURE 4. Tomographic film through level 3.5 inches from posterior chest wall revealing an additional large central right upper lobe cavity.

desired to increase the thickness of the layer in focus, eight or six crank turns can be employed; that is, four or three turns beyond the vertical in each direction. Exposures used are usually about 50 percent more than normal exposure for the desired area. A step-block with lead numbers at  $\frac{1}{2}$ -inch levels is used to check the depth of the level of the part being x-rayed.

Application of this method of tomography has proved to be rapid and simple, giving gratifying results. In a case of fibrocaceous tuberculosis, the tomograph revealed additional cavitation not demonstrated on posteroanterior and stereoscopic views (figures 3 and 4).

## USEFUL PROCEDURES IN THE DIAGNOSIS OF SYPHILIS

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The purpose of this paper is to describe two uncommonly used procedures which may be helpful in establishing the diagnosis of syphilis. These procedures were described orally to the senior author by Lieut. Frank Reynolds, U.S.N.R., and Dr. Earle Moore, of the Johns Hopkins University Medical School. One of the methods has received little attention, no mention of it being found in standard textbooks on syphilis. The other procedure, lymph node puncture, is mentioned by Stitt,<sup>1</sup> fully described by Stokes,<sup>2</sup> and recently shown to be practical by Agee,<sup>3</sup> and Loveman and Morrow.<sup>4</sup>

In the past four months we have encountered four patients in whom the diagnosis of syphilis would have been delayed by using only the usual methods; however, one or the other of the procedures to be described permitted prompt diagnosis.

The first procedure is useful in cases with a skin eruption suspected of being syphilitic. An appropriate lesion is covered with cantharides paste

1. Stitt, E. R., Clough, P. W., and Clough, M. C.: *Practical Bacteriology, Haematology and Animal Parasitology*, 9th ed. p. 153. Philadelphia: P. Blakiston's Sons and Co., Inc., 1938.

2. Stokes, J. H.: *Modern Clinical Syphilology*, 2d ed., pp. 97, 98, 594. Philadelphia: W. B. Saunders Co., 1934.

3. Agee, O. F.: Dark-field Examination of Material from Lymph Node Puncture: Report of Two Cases with No Evident Primary Lesions, *Am. J. Syph.*, 28:57-58, Jan. 1934.

4. Loveman, A. B., and Morrow, R. P.: The Value of Dark-field Examination of Lymph Nodes in the Diagnosis of Early Syphilis, *Am. J. Syph.*, 28:44-56, Jan. 1944.



long enough to produce a bleb (one or two hours is ample time). The blister fluid is then examined with the darkfield microscope for *Treponema pallidum*.

The second technique is employed in cases with lymphadenopathy suspected of being caused by syphilis. With a few drops of normal saline in a syringe fitted with a 19-gage needle, the suspicious node is punctured through a novocain skin wheal and the plunger moved in and out several times so as to aspirate a small amount of material from the gland. The aspirated matter is then examined for *T. pallidum* with the darkfield microscope.

#### Case Reports

CASE 1. A 25-year-old Negro was admitted to the hospital complaining of sore throat and sharp substernal pain at times, accentuated by coughing or deep breathing. Examination disclosed hyperemia of the nasopharynx; enlarged tonsils; moderately enlarged and tender superior, middle, inferior, and posterior cervical nodes bilaterally; slight enlargement of the epitrochlear, inguinal, and femoral nodes bilaterally. A quantitative blood Kahn of 640 Kahn units prompted further questioning of the patient. However, there was no history of penile or other skin lesion. The clinical impression of infectious mononucleosis was not substantiated by heterophile agglutination tests. Aspiration of a cervical lymph node was done, and on the second specimen thus obtained *T. pallidum* was demonstrated with the darkfield microscope.

CASE 2. A 19-year-old Negro was admitted with a skin rash of six weeks' duration. He had a maculopapular eruption over the arms, chest, and abdomen; small superficial ulceration of the glans penis; and slight enlargement of the cervical and inguinal lymph nodes bilaterally. The blood Kahn was positive (40 Kahn units). Darkfield examination of material from the penile lesion was negative; however, *T. pallidum* was found in the fluid aspirated from a cantharides bleb made over a skin lesion of the abdomen.

CASE 3. A 28-year-old white male admitted from overseas with an ulceration of the glans penis of three months' duration, and a maculopapular rash on the chin, arms, and palms of three weeks' duration. Seven darkfield examinations of the penile lesion having been negative, he had been treated with sulfonamides until the skin rash appeared, the drug then being stopped because the eruption was thought to be due to drug sensitivity. Three darkfield examinations of the penile ulcer were done in this hospital, all being negative. In the meantime, the rash became more pronounced and the blood was found to have a titer of 80 Kahn units. A cantharides bleb was then made on a lesion of the forearm, and a positive darkfield obtained on the aspirated fluid.

CASE 4. A 23-year-old white male was admitted, complaining of soreness of the left elbow and right knee for one week. Physical examination was negative except for moderate enlargement and tenderness of the left epitrochlear, axillary, and right popliteal lymph nodes. There was no history of a penile lesion. The blood Kahn was positive (80 Kahn units). Darkfield examination of material aspirated from the epitrochlear node was positive for *T. pallidum*.

#### Conclusion

Gland puncture and aspiration of blebs produced by cantharides plaster are practical diagnostic procedures deserving wider use in the diagnosis of early syphilis.

## A SIMPLE METHOD OF AIR AGITATION FOR PHOTOROENTGEN FILM WASHING

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The role of air agitation in reducing the residual hypo in processing photoroentgen films has been demonstrated in War Department Technical Bulletin TB MED 99, 1 October 1944, which indicates that ordinary methods of washing photoroentgen films are inadequate. The installation of a blower or compressor was suggested as a solution of the problem. With no suitable blower or compressor available, we devised a method of mixing air with the water intake of the standard film developing unit with resulting vigorous agitation of the wash water.

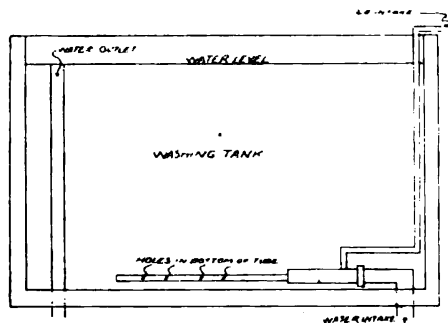


FIGURE 1. Agitator installed in washing tank.

the bottom of a copper tube. The manner of installation in the washing tank is shown in figure 1 and a construction view of the essential parts of the device in figure 2. The entire device must be made of rustproof material and can easily be constructed so that the insert developing and fixing tanks will clear it.

### Method

From the intake, the stream of water passes through a No. 60 drill orifice. The accelerated stream at this orifice outlet draws in air through a  $\frac{1}{4}$ -inch copper tube leading over the edge of the tank. Air and water are mixed in a small chamber and pass into the tank at evenly spaced holes in

### Performance

The device has been in satisfactory use at this station for about two months. A flow of water of barely over 1 liter per minute was necessary before air was sucked into the bottom of the tank. The fluctuations in water pressure caused the action to be unreliable until a water flow of 1.25 liters per minute was reached when operation became continuous and a little more than a liter of air was drawn into the washing tank. The maximum flow of water was 2.1 liters per minute at which speed 1.45 liters of air entered the tank. Water flow within this range is practical in fixed installations where wash water usually enters the tank directly from the community hot and cold water supply.

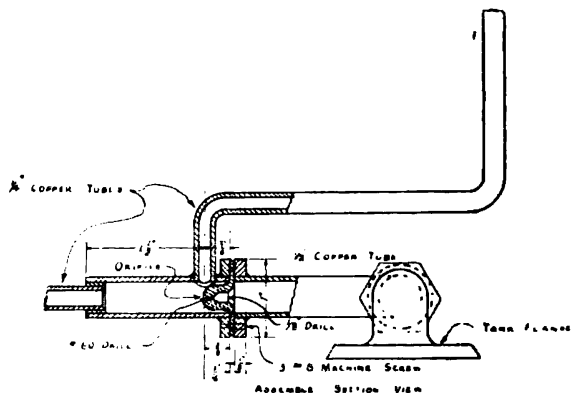


FIGURE 2. Water agitator for x-ray developing tanks.

### Conclusion

This device is inexpensive, contains no moving parts, and once installed may be expected to serve its purpose without further attention. Such a unit could be turned out in large numbers for immediate installation in the standard type of washing tank.

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